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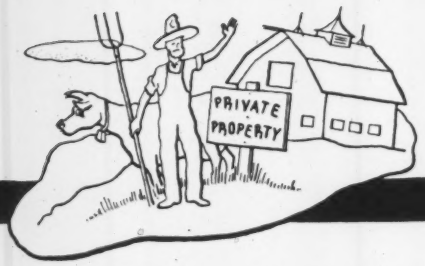
IN THIS ISSUE:

Waterworks Report From Los Angeles Convention



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A MOMENT WITH THE PUBLISHERS

To Catch Up with MOTOR PROGRESS

THIS country is not alone in its drive to reduce the toll of highway fatalities. An Associated Press dispatch tells us that Great Britain has begun a new crusade in behalf of highway safety. Over there they are undertaking, in characteristic British fashion, an exhaustive analysis of some 200,000 road accidents throughout the United Kingdom to determine causes and indicate remedies.

It is noteworthy that this drive involves, in addition to the search for more complete data, a five-year construction program declared by the Minister of Transport to be "by far the largest and most comprehensive effort made by any government." While the accuracy of that statement may be open to question—works approved to be undertaken during the current financial year are estimated to cost $112,500,000—the facts remain that this sum is three and one-half times the expenditure for the same period last year and that in their safety efforts the British are mindful of the important part that must be played by modernizing the highway itself.

"In place of narrow, winding, hedge-lined roads," says the dispatch, "the highway authorities propose, where the traffic is great enough, to have trunk roads containing two lanes for traffic in each direction in addition to footpaths, a path for cyclists and accommodation for horse-riders." Investigations are under way also to develop more effective guard rails and to find materials that will make for anti-skid qualities.

Some Americans may smile condescendingly at such proposals and turn from a reading of the article with a feeling that all this is "old stuff." Four-lane trunk highways are no novelty with us, of course, and it would be easy to conclude that we are away beyond any possible interest in such an elementary program.

FAIR enough. But what about the footpaths? Cyclists and horse-riders may not be the problem here that they are in Great Britain, but if adequate provision were to be made for them without the present desperate risks, more Americans might go in for such diversions. Aside from them, however, only a few American authorities are beginning to recognize that the foot-traveler has rights on the highways and that he should not be expected to risk his life in exercising them. Decidedly we have something to consider here.

Moreover, if we do not have the "narrow, winding, hedge-lined roads" of Old England, we do have a comparable hazard in many miles of main trunk highways that were among the first to be improved and that now are as hopelessly obsolete and inadequate for modern motor traffic as are the winding lanes of Britain.

The irony of this is that our busiest and most important routes naturally were the first to be improved. The standards observed in their design and construction were the highest available *at that time* but with the amazingly swift pace of automotive development in this country *that was a long time ago.* It means nothing to measure such a period in years; it must be measured by the advance in power, speed, weight and number of the vehicles that contend for place on the highways. Today many of these main routes are crude, inadequate and hazardous as compared with many subordinate secondary roads that were built later in the highway program, when the constant development of highway science and the accumulation of experience made higher standards possible.

HERE is a task that calls for immediate and unremitting attention. In some quarters it is under way and real progress is being made. But every main trunk highway that was built ten years or more ago requires today the closest scrutiny and review to determine whether it now measures up to the standards of stability, strength, smoothness, maintenance cost, vehicle-operating economy and safety that have been established since its construction.

This job is of coordinate importance with that of extending the existing highway network to serve more inhabitants and more highway users. Great as is the need for more mileage of improved secondary and land-service roads, these cannot return their full value to the community unless we keep the trunk routes up to the needs of the additional traffic thus developed by extension.

The needs of both trunk and secondary highways demand that all the highway revenue be confined to their intended purpose and plowed back into the highway plant. Thus only can we expect to do a real job of conserving our investment, decreasing maintenance, reducing operating costs and safeguarding life and limb.

Willard Chevalier

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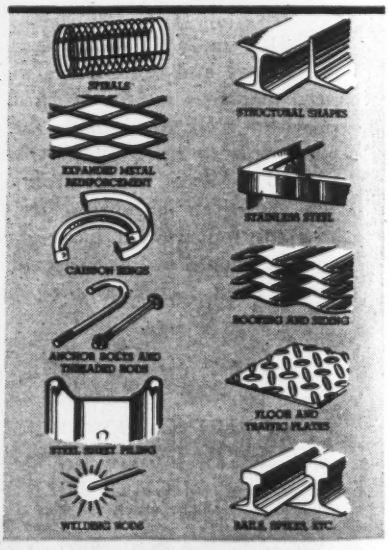

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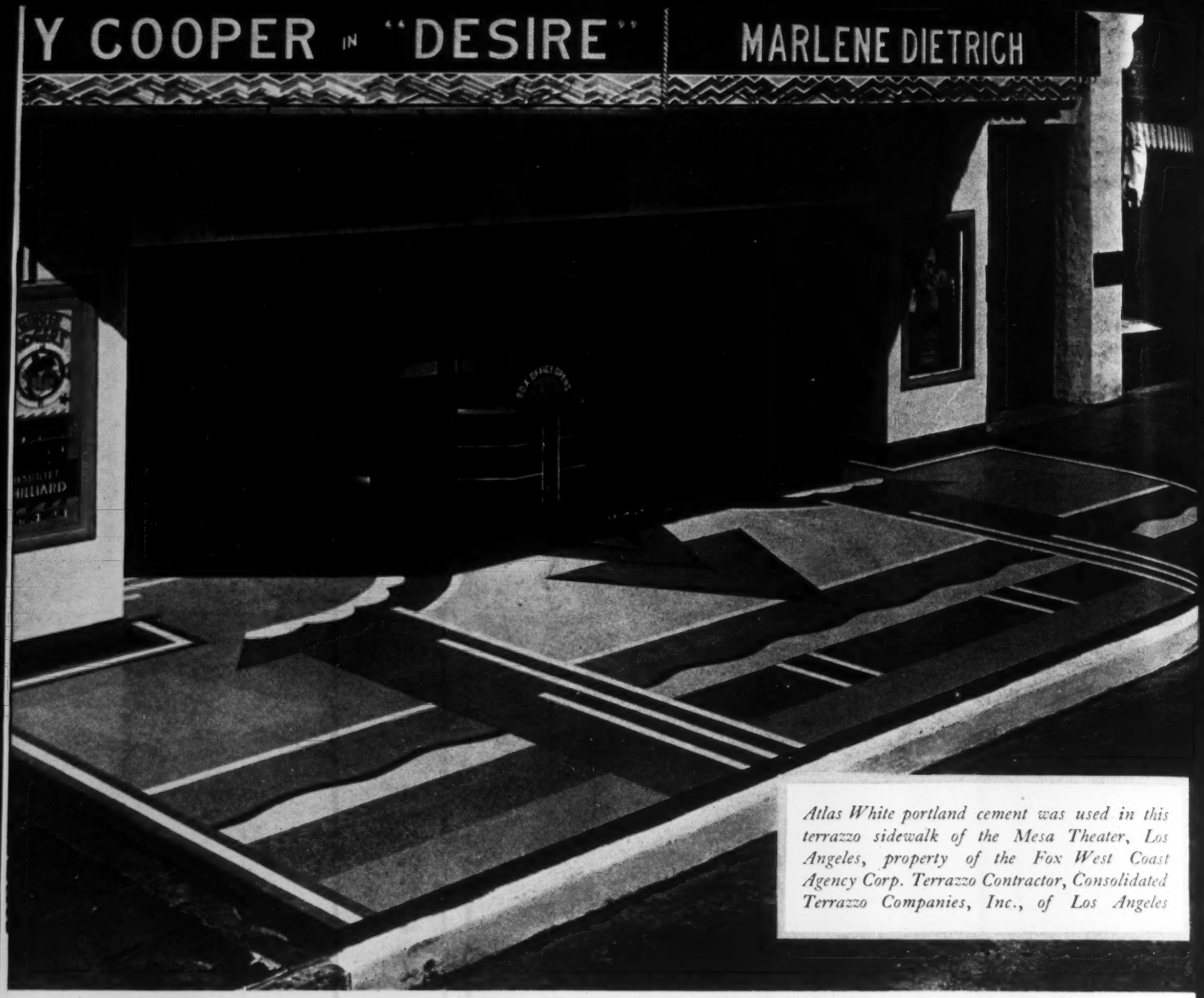
Not All Highbrow—No doubt some of the discussions at the soil mechanics conference next week will be over the heads—or shall we say under the feet?—of most engineers, but there will be much on the practical application of the new knowledge that will be of direct interest to a large number of our readers.

● A running report of the meeting will be published in an early issue to be followed by summaries of some of the papers.



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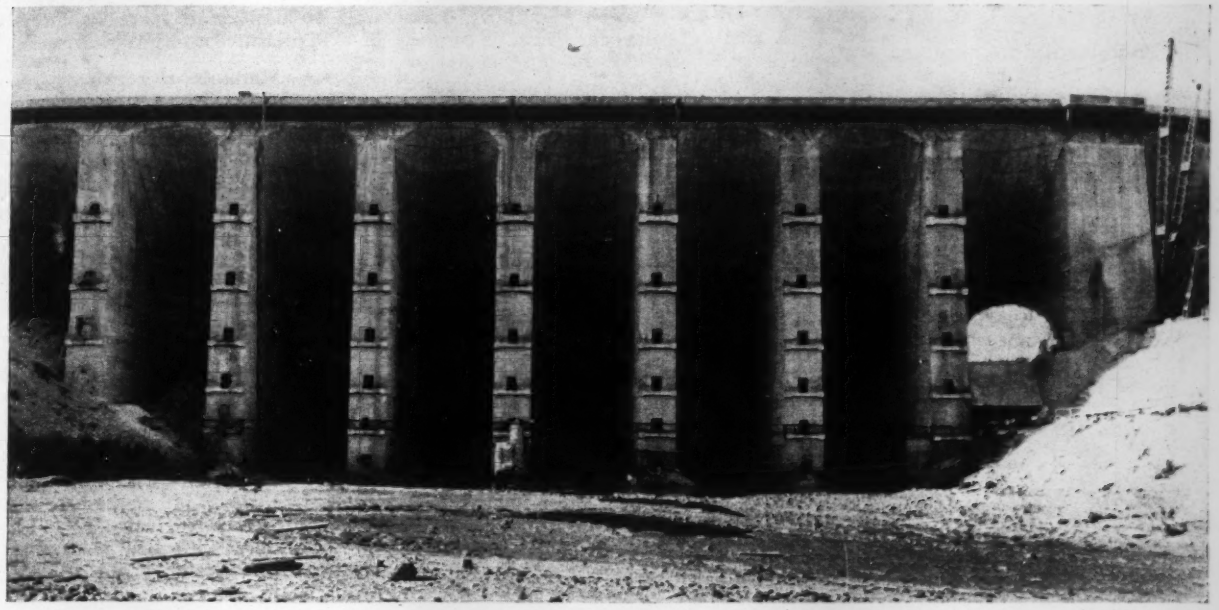


MAIN SECTION OF THE DAM showing openings into buttresses and transverse beams at the downstream end of the several floor levels.

Dam Buttresses Strengthened

Remedial treatment of hollow buttresses of Lake Pleasant multiple arch dam in Arizona includes concrete floors containing layers of pre-stressed T-rails to make dam safe for full reservoir load

By W. W. Lane

General Manager and Chief Engineer, Maricopa County Municipal Water Conservation District No. 1, Phoenix, Ariz.

EXTENSIVE REPAIR work, using methods developed to suit very unusual conditions, has just been completed on the hollow buttresses of Lake Pleasant Dam, a multiple arch dam 170 ft. high in Arizona. Side walls of the buttresses had developed small but extensive vertical cracks, and the objective of the repair was to prevent any increase in this cracking and at the same time to give the buttresses more strength and stability. Remedial measures included building into the buttress several horizontal layers or floors of 85-lb. T-rails so placed as to be effective in carrying tensile stress from up- to downstream faces. The repair work has been entirely successful and the structure now is regarded as safe for storage of water to full reservoir height.

Outlining first the conditions which led to a decision to carry out the recently completed changes in the structure, it may be said that the Maricopa County Municipal Water Conservation District No. 1, which was organized in Arizona in 1925, sold $4,500,000 worth of bonds to finance the construction of an irrigation project. The area placed under ditch includes 39,000 acres which lie about 25 miles northwest of Phoenix. The project contemplated developing a water supply by storing flood waters on the Agua Fria River; construction started on spillway and dam in 1926 and was completed late in 1928. The dam is a multiple arch structure 170 ft. high above streambed (maximum section height 235 ft.) and 1,750 ft. in length.

Soon after the completion of the dam and before any considerable depth of water had been stored behind it, the St. Francis Dam in southern California failed and aroused intensive interest in the safety of dams throughout the Southwest. In the subsequent process of general checking-up, Lake Pleasant Dam was examined by a board of two engineers and one geologist, namely: J. B. Lippincott, Los Angeles; D. C. Henny, Portland and Dr. F. L. Ransome, Pasadena. This board reported that certain features of the dam were of questionable stability if it were to be subjected to full water load.

Thereupon the state of Arizona appointed a board of 15 engineers to investigate and report on the dam with recommendations for such remedial measures as were considered necessary. After several weeks' study and analysis this board pronounced the dam unsafe for storage above El. 130 until the buttresses were strengthened. The recommendations were that a backfilling of earth on the downstream side of the dam should be put in and carried up to El. 120. If this backfill could not be made immediately the recommendation was that the spillway should be lowered to El. 130. (All these elevations refer to "streambed level," which was assumed as a zero datum for the dam project.)

The unfavorable publicity resulting from this report on the dam naturally had a bad effect on the standing and prospects of the district as a whole, with the result that the management was unable to finance the reconstruction recommended. The state, therefore, through its police powers, as a protection to life

and property, appropriated $175,000 as an emergency measure and cut a channel through the spillway 175 ft. wide extending down to El. 130 as recommended. This work was completed in April, 1929, and the structure was left in that condition for several years.

Reconstruction program

In February, 1935, the district obtained a loan of $1,350,000 from the self-liquidating division of the RFC to be used in repairing and strengthening the dam, rebuilding the spillway structure and doing rehabilitation work needed on the canal system.

The district did not approve of the backfill method of strengthening the dam. Reasons for this were lack of stability in the support afforded by a fill, the uncertainty and possible risk in resultant earth pressures against the back of the arches and against the hollow buttresses, the high cost of this method, and other considerations.

Analyses of the dam disclosed that high tensile stresses existed along the upstream edge of each buttress and that these stresses were not taken care of by the reinforcing steel of the original design except in the upper 60 ft. of the structure. An economical method therefore was worked out for so changing the structural design that these tensile stresses would be adequately provided for and the buttresses would be strong enough to carry the full water load.

Incidental to the strengthening of the dam itself, the spillway was reconstructed to permit storage to the level of the spillway lip in the original design. Also a bridge was built across the top of the dam replacing the 3-ft. walkway originally provided. During the reconstruction period this bridge was a great convenience in delivering steel for placement in the buttresses. After completion of repair work it has permanent value in providing ready access to the spillway, an important consideration during flood periods.

The buttresses in the main dam are 16 ft. wide and are spaced 60 ft. apart, center to center. In elevation they are of triangular shape; the upstream face has a 1:1 slope and the downstream face a 1:10 slope. The buttresses are hollow, with two vertical side walls 18 in. thick at the top, increasing to 6 ft. thick 220 ft. below the crest. The two walls are joined at the upstream face by heavy concrete, referred to as the water slab, which carries the water load across the space between the two walls. At the downstream face an 18-in. wall ties the two buttress walls together from crest to base. Within the buttresses vertical tie walls 16 in. thick are spaced at intervals of 40 ft. measured up- and downstream.

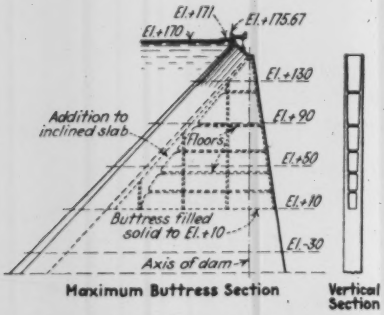


Fig. 2—ELEVATION THROUGH MAXIMUM SECTION of Lake Pleasant Dam showing the concrete added to the buttresses.

Methods of repair

In the dam itself the remedial measures in the main consisted of three features: (1) a heavily reinforced addition to the water slab made parallel to but not integral with it on the downstream side; (2) a series of reinforced horizontal floors extending from the new water slab to horizontal beams on the downstream face and (3) mass concrete in all buttresses from the base to an elevation 10 ft. above original streambed.

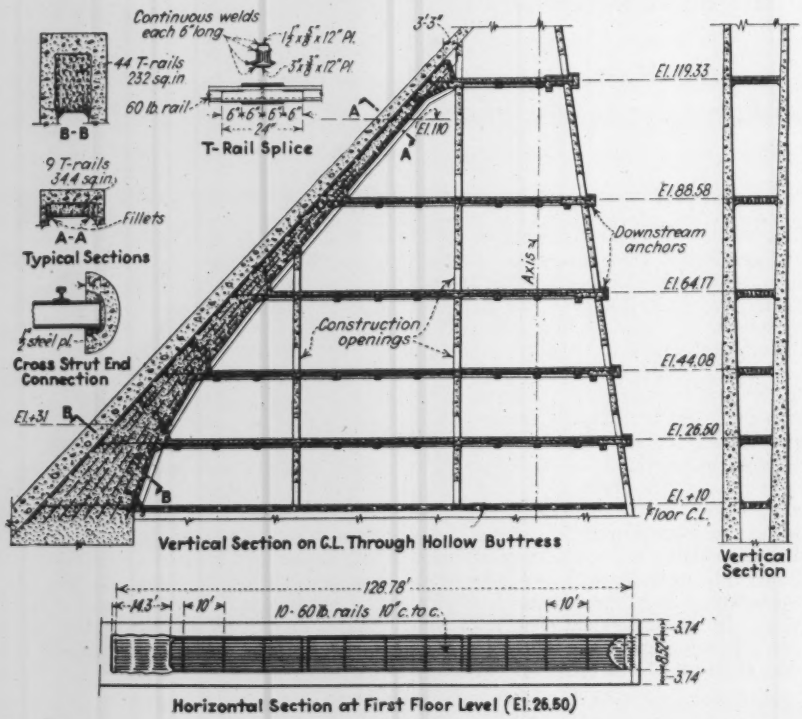
The new water slab was put on in the form of layers of shotcrete extending from the base, or from the top of the new mass concrete, to a level 40 ft. below the crest. After placement of the additional layer the thickness of the water slab varied from 27 ft. at the base to 2½ ft. at its top. Bond between the sides of the original buttresses and the new water slab was made by checkering the old concrete with 12-in. squares recessed or gained 2 in. into the surface. Also, 1½-in. square dowels were grouted into holes in the old concrete from top to bottom before the shotcrete was applied. Spacing of these dowels increased uniformly from 12 in. at the top to 24 in. at the bottom.

Near the inner face of the new water slab 1¼-in. square reinforcing bars were spaced at intervals equal to the dowel spacing in the sides. Also heavy reinforcing was used in the area of junction between the water slab and each horizontal floor. At these junctions "U"-shaped reinforcing bars and transverse rails set into the buttress walls on opposite sides were used to provide terminals and anchorage for the longitudinal rails of each floor. Finally, the heaviest reinforcement in the new water slab consists of 60-lb. T-rails paralleling the upstream face of the buttress; 44 of these rails were put in at a level 10 ft. above streambed, and the number decreased gradually to nine at the top of the new water slab.

In each buttress the original base was cast solid for a depth varying with the elevation. In the reconstruction, dowels were grouted into holes drilled into that portion of these solid bases within the area that would be in contact with the new water slab. T-rails in the new water slab lapped the dowel bars and thus anchored the new slab to the buttress base. Where additional mass concrete was placed to raise the solid portion of the buttress to a level 10 ft. above streambed, the rails in the new water slab were embedded to a depth of 5 ft. in the mass concrete.

In general the structural scheme in the horizontal floors was to provide effective anchorage for one end of the hori-

Fig. 3—ELEVATION THROUGH HOLLOW BUTTRESS section. Above the sold bases the buttresses now have horizontal floors containing layers of T-rails.



zontal rails in the new water slab and for the other end in a transverse beam or downstream anchor on the downstream face of the buttresses. The T-rails used were all of the same weight, but the number varied at different elevations as shown in Table 1. All rails on each floor were extended into the area to be occupied by the new shotcrete water slab and there, before the shotcrete was placed, were welded to steel provided for anchorage. This constituted the upstream anchorage.

At the downstream face of the buttresses the horizontal rails extended a foot beyond the old concrete and outside the buttress were welded to two crossrails. A concrete anchor built around these crossrails was designed to transfer the prestressed load from longitudinal rails to the buttress side walls. The anchor consisted of a number of bars bent into a parabolic curve; equal numbers of the bars were placed above and below the longitudinal rails in the floor. The parabolic bars were welded to a pair of channels at the downstream end and completion of the beam or anchor was effected by encasing the steel, after connections were welded, in heavy shotcrete covering.

After the horizontal T-rails had been welded in place at both up- and downstream anchorages, prestressed (as will be described later) and finally welded at the butt-joints where rail ends met, each layer was covered with shotcrete to a thickness of 12 in., making a solid horizontal slab or floor. Also, 12x12-in. fillets were put in to make effective connections between these floors and the side walls.

The third and most easily accomplished remedial measure was to fill the bases of buttresses with mass concrete to an elevation 10 ft. above original streambed. This procedure so reduced stresses below this elevation that no further reinforcing was required in the solid bases. Mass concrete also was placed in other buttresses to assist in the anchorage of the new water slab.

Sequence of work within buttresses

The contractor entered each buttress at its lowest elevation by cutting a portal in the crosswall that constitutes the downstream face. Portals also were cut through all interior vertical walls at the same elevation. Seats then were cut into the buttress side wall from within to receive the I-beam cross-struts whose purpose was to support the rails in the horizontal floors. These I-beams also provided a support on which scaffolding could be erected for working on the floor next above. At the same time that portals and seats for the cross-struts were being cut the contractor also drilled all dowel holes, recessed the sides of the old buttresses where contact for the new water slab was required and roughened up the walls in the areas to be bonded to the floors.

After the cutting and the drilling of old concrete was completed, dowel bars were placed in bases and sides of the buttresses, T-rails and other reinforcing members were put in the water slab, and then steel in the horizontal floors was assembled. Structural steel and parabolic bars for the downstream anchor were the last steel items on each floor to be placed. Horizontal layers of rails in the several floor levels were prestressed simultaneously and finally were welded to the up- and downstream anchors. Tests had been conducted previously to determine the value of welds at rail splices, and these tests governed the total amount of welding at each rail connection.

Forming the new water slab and the downstream anchors followed. In this work a mixture of one part portland cement (containing 30 per cent of finely ground tufa) to four parts of sand by volume was used for the downstream anchors and for the portion of the water slab adjacent to its junction with the horizontal floors. For those portions of the water slab between horizontal floors a mix of 1:4½ was used. Variations from the nominal mixes were required to make correction for bulking on account of varying moisture content of the sand. The sand used had a fineness modulus of 2.75 to 3.25.

In building up the water slab with new shotcrete, the sides were brought up faster than the middle, that is, the upstream side was kept constantly at a higher elevation than the downstream side. Each lift was in the shape of a block "V." Shotcrete was built up to a maximum height of 3 ft. in each lift, measured along the sloping water slab, and successive lifts were made at intervals of not less than four hours. The construction program was so worked out that water slabs in some of the smaller buttresses were formed during the summer, when outside air temperatures reached 119 deg. The serviceability of shotcrete in the new water slabs, as well as the success in methods of placing, was demonstrated by the fact that not a single instance of checking has been discovered along the contact plane between the new water slab and the old buttress walls. About 70 per cent of the new water slab was completed by the first of October, 1935, which made it possible to make inspections during the ensuing winter months. All the water slabs were completed in February, 1936.

Following the completion of water slabs and downstream anchors as well as the welding of joints between horizontal rails and their anchors, the rails were given an initial tension, thus placing a compressive stress in the buttress side walls. This was done by means of an ingenious frame fitted over each pair of abutting rail ends and spread by a hydraulic jack. Details of this jacking device are shown in Fig. 4. Essentially the frame constituted of an attachment

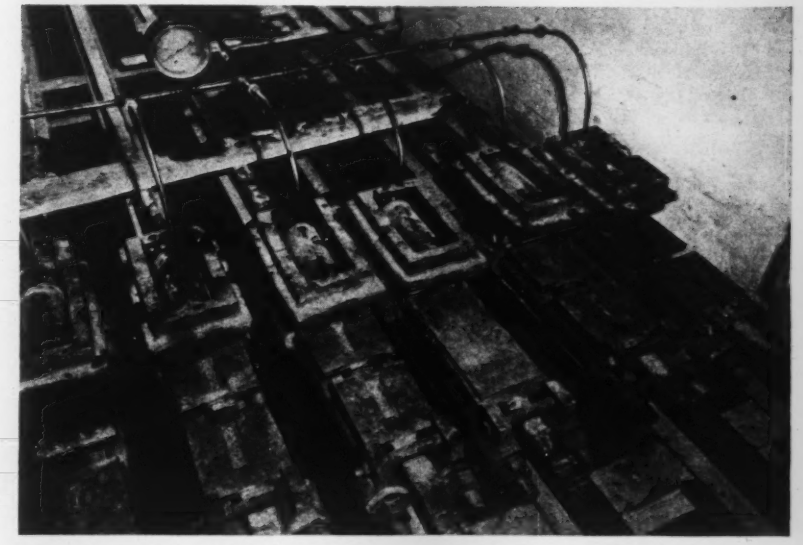


Fig. 4—JACKING FRAMES AND JACKS inside the buttresses ready to put stress in the rails. Note common pressure supply to secure uniformity of stress.

Fig. 5—RAIL CONNECTION DETAILS. Frames were bolted to the rails to provide shoulders against which to jack. After prestressing, top and bottom plates were welded on, to retain stress in the rails.

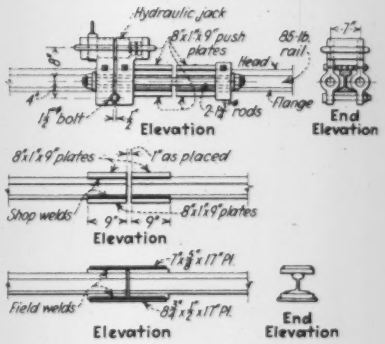


TABLE I—LOCATION OF STEEL AND AMOUNT OF PRESTRESSING

Floor Elevation*	Number of 85-Lb. T-Rails	Unit Stresses (Lb. per Sq.In. of Effective Area)	Total Prestress Lb.	Parabolic Bars in Downstream Anchor Number	Parabolic Bars in Downstream Anchor Size (In.)
129.33	13	12,000	1,200,000	10	2 x 2
88.58	7	11,000	581,000	6	2 x 1½
64.17	6	10,000	450,000	6	2 x 1¼
44.08	5	9,000	330,000	6	2 x ⅞
26.50	7	8,000	376,000	6	2 x 1

*Streambed elevation is 0.0; top of parapet wall is El. 175.66.

bolted on behind push plates welded to each of the two abutting rail ends. The upper projections had corresponding recesses which, together, formed a box-like space for receiving the hydraulic jack. Thus the thrust of the jack forced the two halves of the box apart and pulled the two rail ends together. The jacks for each floor were all fed from the same high pressure manifold so exactly the same stress was supplied to each. All rails in each buttress were prestressed simultaneously and the pressure in the jacks was maintained until the rail ends were welded together. After the welds had cooled the jacks were removed, leaving the welds to hold the rails in position.

After the welding the rails were encased in shotcrete to form a solid horizontal floor transmitting loads from the buttress walls to the floor rails.

To allow for temperature changes a 12-in. longitudinal opening was left in the middle of each floor while the shotcrete was taking its set. This opening was not filled in until the temperature of the floor reached the temperature of the air within the buttress, which required about four days. Filling in the gap in the floor was the last of the work to be done inside the buttresses and thereafter the holes that had been cut in the downstream face of the buttress were permanently closed with shotcrete.

In reconstruction of the spillway a considerable increase in capacity was possible. Originally there were 29 tainter gates, each 16 ft. high by 23 ft. wide. Eight of these gates had been removed in 1929, and in this portion of the spillway the sill had been lowered 24 ft. In the reconstruction this deeper section was equipped with four tainter gates and one automatic sector gate of Stauwerke design; all these gates were 24 ft. high by 34 ft. wide.

The resulting spillway capacity is 157,000 sec.-ft. with a freeboard of 5.66 ft. This is believed to be ample for the maximum flood from a drainage area of 1,600 sq.mi. The automatic sector gates will be connected by means of electric controls to the two adjacent tainter gates, thus giving automatic control for 40,000 sec.-ft. or almost a quarter of the total capacity.

The reconstruction work on the dam has been under the direction of the writer, R. V. Leeson, assistant engineer, and J. A. Fraps, designing engineer, and resident engineer on construction. The design was worked out by the district engineering staff in connection with Quinton, Code & Hill, consulting engineers, Los Angeles. The contract has been carried out by the Pleasant-Hasler Construction Co., Phoenix, Ariz.

Long-Range Flood Predictions

Study of all available flood records indicates that the use of duration curves for long-range predictions may result in error due to a change in the slope of the flood probability line near the 100-yr. point

By C. R. Pettis
Colonel, Corps of Engineers, U. S. Army, Fort Hayes, Columbus, Ohio

DURATION curves have been used by engineers for a number of years in connection with runoff studies. As a result of several years of study of all available flood records published in the United States, the author of this article evolved a "width formula" for use in flood studies. Its development was discussed in an article published in *Engineering News-Record*, June 21, 1934, p. 804. During the course of the studies leading up to the evolution of that formula the author came to the conclusion that all duration-curve methods of determining maximum flood flows have limitations that should be recognized by all engineers who are in the habit of using such methods.

In a paper on Theoretical Frequency Curves, *Transactions*, Am. Soc. C.E., Vol. 88, 1924, p. 142, H. Alden Foster presented a mathematical method of computing flood probabilities from data that can be obtained from a river record. Subsequently (1930), in a book entitled Flood Flows, Allen Hazen presented and discussed the application of a method which in its main features is similar to the Foster method, but being less technical is more popular. The present discussion will apply equally to the Foster and Hazen methods.

In the Foster method it is customary to use the maximum annual flow in cubic feet per second for each year of the record; the annual flows are generally expressed in terms of the mean annual flow, and a duration curve is constructed. From the curve we can determine the size of the flood that will probably be "equalled or exceeded" in a given probability period, such as 100 years or 1,000 years.

The author uses a slightly different unit for the 100-yr. flood; the probable 100-yr. flood is the most probable value of the maximum discharge in cubic feet per second which may be expected to occur at any specified river station, within any given period of 100 years. The author considers that this definition is more logical than the other definition, and in some ways it is more convenient. Either definition can be used if we keep in mind the following relation; the probable P-year flood corresponds to the duration curve value of the flood that will be equalled or exceeded once in 2.5 P years.

In order to simplify this discussion it will be based on uncontrolled river flow in the Eastern part of the United States. If a typical river record is analyzed, and the probable floods are plotted as ordinates to a natural scale, against probability periods plotted as abscissas to a logarithmic scale, it will be found that the resulting curve approximates a straight line. This is illustrated in Table I and Fig. 1. In Table I the first column shows the annual floods for a period of 32 years. The mean annual flood, or the probable 1-yr. flood, Q_1 is 121,300. The second column gives the maximum floods selected from sixteen 2-yr. periods, and $Q_2 = 137{,}500 = 1.13\ Q_1$. The various points are plotted in Fig. 1, and the line extended to give the probable 100-yr. flood; $Q_{100} = 2.12\ Q_1 = 257{,}000$. The same data with the Foster method gives $Q_{100} = 253{,}000$. It is not necessary for the probability periods to be multiples of 2.

Forty river records were analyzed by the logarithmic method above described. The indications are that the curve is slightly concave upward for drainage areas less than 1,000 square miles. For areas between 1,000 and 40,000 square miles it seems safe to assume that the curve is a straight line. Ordinarily the logarithmic method gives practically the same results as the Foster method, although it is not as accurate mathematically. It is believed that an analysis by the logarithmic method will at times give a better indication of the value of the particular river record as a "sample" of the long time behavior of the river. The logarithmic method has all the defects of the Foster method when used with short time records.

Many short time river records are not fair samples upon which to base long time probabilities. Specifically, a Foster determination of the probable

100-yr. flood, from a 20-yr. river record, will have a probable error of about 25 per cent, and is therefore not even a good guess. This statement has been checked in various ways. Convincing evidence can be obtained by taking almost any river record which contains two or more 20-yr. periods, and applying the Foster method to different 20-yr. periods on the same river. A Foster determination of Q_{100} from a 35-yr. record has a probable error of about 10 per cent; and longer records are correspondingly more accurate. In Fig. 2C between 1-yr. and 100-yr. is shown the average position and the ordinary range of Foster or logarithmic curves between the limits stated, as determined by Foster computations for 100 rivers. For most of these rivers the true slope of the curves can be determined with fair accuracy from the width formula and certain water shed characteristics. The true curves will have about the same range as shown in Fig. 2C.

As stated in the previous article on this subject, there are about two hundred 100-yr. floods of record in the United States. The following statements are based on a statistical consideration of the 200 floods. The probable 1,000-yr. flood is about 20 per cent greater than the probable 100-yr. flood. The probable 10,000-yr. flood is about 30 per cent greater than the probable 100-yr. flood. The maximum flood of authentic record is about 35 per cent greater than the probable 100-yr. flood. This indicates that the curves for all the rivers between 100 years and 10,000 years follow approximately the heavy line shown in Fig. 2C between the given limits. There is a change in the slope about the 100-yr. point, and this indicates another serious limitation of the Foster method with short time records.

The break in the curve at the 100-yr. point is contrary to most of our previous conceptions of the subject. The subject of flood probabilities has many complications, but the author believes that the break in the curve can be explained in a simple manner that will cover the most essential features. In order to simplify the discussion it is necessary to base it upon a certain size of drainage area, and for this purpose we will assume 4,000 sq.mi.

In Fig. 2A is given the curve for rainfall in Iowa, as determined from station records. This has been checked against information in the Miami Technical Report on Storm Rainfall, and it is believed that the curve is fairly typical for the eastern United States. This curve is based on records at individual stations, and it therefore contains many records of storms that were limited in extent and purely local in their nature. If we are to consider areas of 4,000 sq.mi. it is necessary to have a similar curve which will show the probability for average rainfall over the larger area.

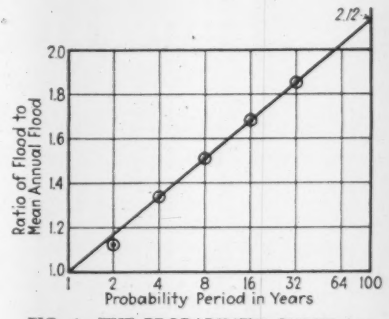


FIG. 1—THE PROBABILITY CURVE for the Susquehanna River at Wilkes-Barre, Pa., plotted logarithmically from the records given in Table I is nearly a straight line. The 100-yr. flood ratio is 2.12.

TABLE I—MAXIMUM FLOODS IN THE SUSQUEHANNA RIVER AT WILKES-BARRE, PA., FOR A 32-YR. PERIOD—1891–1922

Quantities in 1,000 sec.-ft. for the frequency periods indicated

1 Yr.	2 Yr.	4 Yr.	8 Yr.	16 Yr.	32 Yr.
164	164	164	164	....	....
110	110	....	....	....	....
114	114	....	....	....	....
95	....	....	....	....	....
112	....	....	....	....	....
134	134	134	....	....	....
70	....	....	....	....	....
76	....	....	....	....	....
80	....	....	....	....	....
114	114	....	....	....	....
166	....	....	....	....	....
224	224	224	224	224	224
118	....	....	....	....	....
123	123	....	....	....	....
128	128	128	....	....	....
76	....	....	....	....	....
94	....	....	....	....	....
112	112	....	....	....	....
124	....	....	....	....	....
156	156	156	....	....	....
93	....	....	....	....	....
116	116	....	....	....	....
184	184	184	184	184	....
182	....	....	....	....	....
128	....	....	....	....	....
159	159	159	159	....	....
79	....	....	....	....	....
124	124	....	....	....	....
70	....	....	....	....	....
155	155	155	....	....	....
117	117	....	....	....	....
83	....	....	....	....	....
3880	2200	1304	731	408	224
32	16	8	4	2	1
121.3	137.5	163	183	204	224
1.00	1.13	1.34	1.51	1.68	1.85

Sum.....
Number of floods
Average (probable flood)....
Probable flood divided by Mean (121.3).

From Fig. 1, $Q_{100} = 121, 300 \times 2.12 = 257,000$.
By the Foster method, using same data, $Q_{100} = 253,000$.

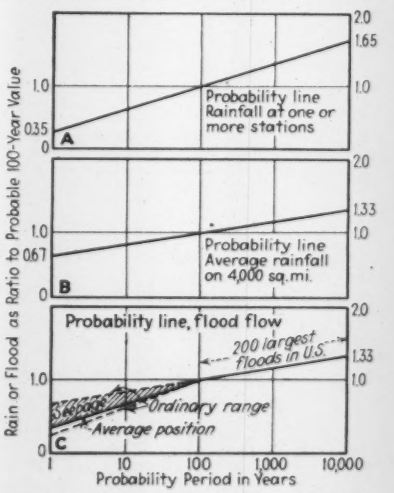


FIG. 2—ANALYSIS of many flood flows indicates that there is a break in the probability line at about the 100-yr. point.

The time-area-depth studies of the Miami Conservancy District indicate that the precipitation on areas of 4,000 sq.mi. is subject to less variation than the precipitation at individual stations. An analysis of the available information indicates that the curve in Fig. 2B may be taken as fairly typical of rainfall probabilities on areas of the size under consideration. If there were the same percentage of runoff from every storm, we would expect the floods to follow approximately (but not exactly) the same probability curve as the rainfall. It may be noted that between 100 years and 10,000 years the flood curve in Fig. 2C and the rainfall curve in Fig. 2B are the same; but they are not the same between 1 year and 100 years.

Many large storms come when the soil is dry, seepage is large, and the runoff may be less than half the precipitation; these floods are not in the 100-yr. class. It can be stated as a general principle that large floods in the 100-yr. class occur only when conditions are favorable for a large runoff; in a humid climate this means that the soil must be fairly well saturated at the beginning of the storm, so that the runoff will approach 100 per cent of the precipitation. In more arid regions the runoff of 100-yr. floods will approach the maximum for the locality.

We may express the relation as follows:

Precipitation = Seepage + Runoff.

For large storms, if the seepage is large, the runoff is comparatively small. If the seepage is small, the runoff is large. For the 100-yr. and larger storms seepage is at a minimum.

Let us now consider these relations with reference to Fig. 2C. For all large floods between 100 years and 10,000 years, seepage will either be negligible, or near the minimum for locality; and the flood curve will have about the same slope as the rainfall curve in this range. As we go down the probability scale under 100 years, seepage becomes an increasing factor, and the flood curve falls farther and farther below the rainfall curve, as is indicated graphically in the figure.

The evidence indicates that there is ordinarily a break in the slope of the duration curve at about the 100-yr. point, and that the break is of such a nature as might be expected from the seepage effect. The break in the duration curve will not appear when the record on which it is based is less than 100 years, and there is practically no river record in the United States longer than 100 years. If there is a break in the curve near the 100-yr. point, a duration curve based on the record of less than 100 years will not indicate correctly the probabilities for a period of 1,000 years or greater; and the indicated limitation on duration curves should be taken into consideration by all who have occasion to use such curves in their work.

Simple Tests Determine Hydrostatic Uplift

A study of hydrostatic uplift in clay and concrete with an analysis of simple tests for determining values

By Karl Terzaghi
Visiting Professor, Harvard University, Cambridge, Mass.

THIS ARTICLE is a description of three independent methods for determining the value of the reduction factor x employed in calculations of hydrostatic uplift. Each method is simple enough to be used in any materials or soil testing laboratory. In the discussion a uniform notation given in the accompanying panel is used throughout. The meaning of other symbols is explained in the text as the discussion proceeds.

Manifestations of uplift

The best known manifestation of hydrostatic uplift is that it reduces the pressure of engineering structures on their bases, provided that the base is located below the free-water level. In the case illustrated by Fig. 1, the weight which acts on the soil beneath the base of the pier is equal to $G - FHs_o x$ wherein G is the total weight of the pier. Fig. 2 shows another case of a similar type. It represents a section through a low concrete dam founded on a bed of fissured shales with thin, horizontal seams of clay. Failure would occur by sliding along the uppermost layer of clay, AB, in Fig. 2. The frictional resistance against sliding depends on the effective weight which acts on AB. This effective weight, G_1, is equal to the difference between the total weight G of the masonry, the shale and the water located above AB and the hydrostatic uplift, or

$$G_1 = G - 1/2\,(h_1 + h_2).\,Fs_o x$$

The values h_1 and h_2 represent respectively the height to which the water would rise from the fissures in the shale into standpipes located at the points A and B, Fig. 2. For $x = 1$ the value of G_1 might be less than one-half of the corresponding value for $x = 0$. Therefore the value of x has a very important influence on the factor of safety of the structure against sliding.

Symbols Used

- F = area of a section or of the base of a structure
- xF = effective area or that part of an area over which the hydrostatic uplift acts
- x = reduction factor
- H = depth of a point below the free water level
- h = height to which the water rises in a standpipe
- s_o = unit weight of the water
- $n_w = hs_o$ = pressure in the water
- n'_s = total normal pressure per unit of area of a section
- $n = xn' - xn_w$ = effective normal pressure per unit of area of a section

The meaning of the other symbols used is explained in the text.

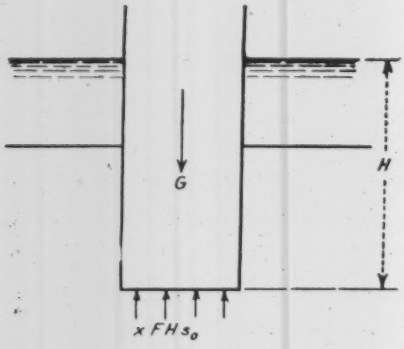
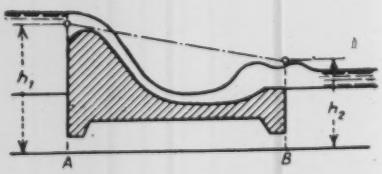


FIG. 1—MASONRY pier subject to hydrostatic uplift.

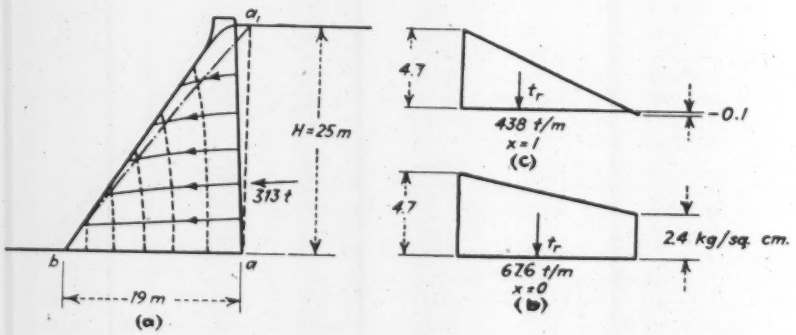
FIG. 2—HYDROSTATIC uplift in a clay seam AB located beneath the base of a low concrete weir.



Another important manifestation of the hydrostatic uplift is illustrated by Fig. 3a which shows a section through a concrete dam of the gravity type on a perfectly impermeable base. If the dam consists of well-prepared concrete the quantity of water which percolates through the body of the dam towards the downstream face is equal to the quantity of water which evaporates along the face. Therefore the downstream face will appear to be dry. Nevertheless there will be a continuous though imperceptible flow of seepage water from the reservoir toward the downstream face as indicated in Fig. 3a by arrows. If the permeability of the concrete is uniform throughout the dam the hydrostatic pressure along the base of the dam will increase from H at the upstream edge of the dam to zero at the downstream edge as shown by the ordinates of the dash-dotted line $a_1 b$ in Fig. 3a. The hydrostatic uplift along the base of the dam is about equal to $\frac{1}{2}Hs_o x$. To illustrate the influence of the value x on the state of stress in the dam two extreme cases will be considered, namely $x = 0$ and $x = 1$. The corresponding distribution of the normal pressure over the base is shown in Fig. 3b and c. The values shown in the diagrams b and c of Fig. 3 were computed on the assumption of a straight line distribution of the pressures over the base of the dam. A more accurate method of computation was published by the author in the journal "Die Bautechnik" 1934, H.45.) Comparing these two diagrams one realizes that no reliable information as to the true state of stress in a concrete dam can be obtained unless the value x is known.

It is obvious that the uplift acts only on that portion of the basal area which is in direct contact with water. Yet any attempt to estimate the effective frac-

FIG. 3—(a) CONCRETE gravity dam on an impermeable base; (b) pressure in concrete above base for $x = 1$, and (c) for $x = 0$.



tion x on the basis of this vague and general statement must be considered pure speculation unfit for practical use. Reliable information regarding the reduction factor x can only be obtained from direct measurements of the uplifting force itself or of its mechanical effects. The following methods are available:

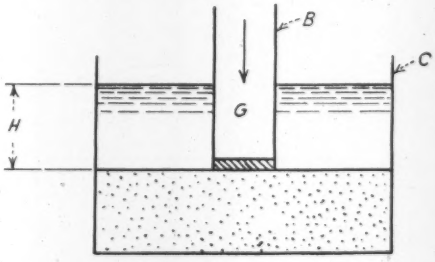
Floating test has limited value

The fundamental principle of the floating test is shown in Fig. 4, which represents a section through a vessel C whose bottom is covered with a layer of saturated sand. The sand carries a cylindrical vessel B with a known weight G and a plane bottom, which covers an area F. The test is performed by gradually filling the space between the surcharge B and the wall of the vessel C with water and by determining the depth H of the water at which the surcharge G begins to float. At this instant the hydrostatic uplift $FHs_o x$ is equal to the weight G. Hence

$$x = \frac{G}{FHs_o}$$

wherein all the quantities are known. During the last fifty years many investigators in different countries used this method with variations in the details of the test arrangement. All of them arrived at the conclusion that the

FIG. 4—APPARATUS for floating test; S = layer of saturated sand, B = bearing block with weight G; the water level is raised until B begins to float.



reduction factor x for sands is almost equal to unity.

The method is open to the objection that the results are valid only for the state immediately before the effective surface pressure becomes equal to zero and the method fails when applied to materials with an appreciable cohesion such as plastic clays or concrete. In order to determine the value x for these two materials different methods must be used. The following paragraphs contain a description of the procedures employed by the author.

Buoyancy compression test

This test serves to estimate the reduction factor x from the compression produced by an increase of the hydrostatic pressure in the liquid above the surface of a layer of plastic clay. The sample occupies the lowest part of a cylindrical vessel C, Fig. 5a, with a height of about 250 cm., a diameter of 10 cm. and a cross sectional area $F = 79$ sq.cm. The upper surface of the sample Cl is covered with filter paper and a layer of fine sand which in turn carries a perforated brass pipe B with a massive bottom plate. The total weight of this surcharge is G and the pressure exerted by this surcharge on the surface of the clay is $q = G/F$. Fig. 5b shows the relation between the load q per unit of area and the corresponding thickness d of the sample. By increasing the surcharge from $q_1 = G_1/F$ to $q_2 = G_2/F$ with the water standing in the vessel C, Fig. 5a at the level of the base of the surcharge the thickness of the sample decreases by Δd_1 as shown in Fig. 5b. If the same increase of the pressure on the sample from q_1 to q_2 is performed only by filling the vessel C with water until hs_o becomes equal to $q_2 - q_1$, the resulting decrease Δd of the thickness of the sample will be smaller than Δd because the water pressure acts only on the difference $F(1 - x)$ between the total area F and the effective area xF of the surface of the sample. Assuming a straight line relation between q and d for the pressure interval q_1 to q_2 we obtain

$$\Delta d_1 = \Delta d \frac{(q_2 - q_1)(1 - x)}{q_2 - q_1} = \Delta d(1 - x)$$

$$\text{or } x = 1 - \frac{\Delta d_1}{\Delta d} \qquad (1)$$

In the tests which were performed in the laboratory of the author, the initial thickness of the sample was equal to 1.5 cm. and the values of Δd varied between 0.1 and 0.5 mm. or between 40 and 200 division lines on the Ames dials. However, in no case was the value of Δd_1 important enough to be measured which indicates a value of x, equation (1), close to unity.

To obtain the value of x for concrete, cylindrical specimens were used with a height of 20 cm. and a diameter of about 7 cm. One set of tests was made on specimens in a dry state whose entire surface was covered with a water-tight jacket. The specimens were introduced into a container C, Fig. 6a, and subjected to hydrostatic pressures up to 200 kg. per sq.cm. and their axial compression Δd was measured for different external pressures by means of the Ames dial A, Fig. 6a. A second set of tests was made, identical with the first except that the water-tight jacket was omitted. The specimens were introduced into the container in a saturated state and the liquid under pressure communicated freely with the liquid in the voids of the concrete. As the hydrostatic pressure in the first series of tests was increased from zero to 200 kg. per sq.cm., the axial compression increased up to 0.5 mm., or up to 200 units on the dial. In the second series the axial compression produced by the hydrostatic pressure was too small to be measured.

These test results demonstrate that the compression of the tested materials depends exclusively on the difference

FIG. 6—HYDRAULIC chamber, (a) for measuring compression produced by increase of hydrostatic pressure in the chamber and (b) for combining hydrostatic pressure with axial excess pressure q.

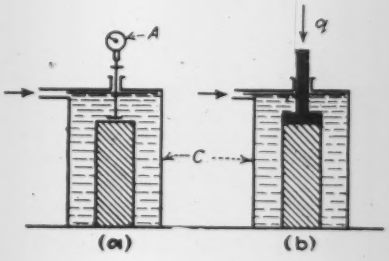
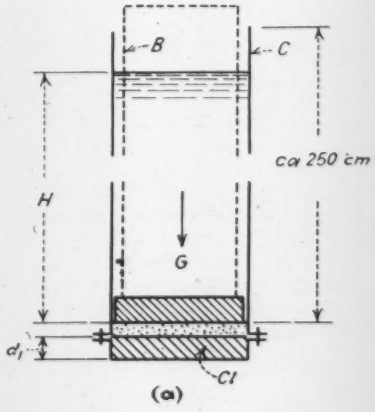
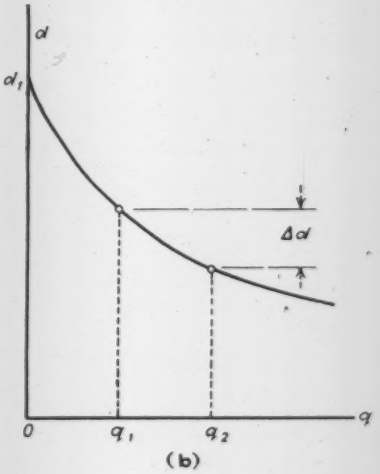


FIG. 5—(a) APPARATUS for buoyancy compression test on clay Cl; (b) shows the relation between vertical pressure q due to weight G and the corresponding thickness d of the sample; in a second series of tests the vertical pressure q is increased by filling the vessel C with water at constant weight G.





between the total pressure and the hydrostatic pressure in the interstitial liquid regardless of how small the voids may be.

In each of the tests illustrated by Figs. 4, 5 and 6 an increase of the pressure n_w in the liquid automatically produced an increase of the pressure of equal intensity in the solid part of the testing material. In the following discussions any pressure of this type will be called a *neutral pressure*. The test results cited disclose the important fact that an increase of a neutral pressure produces no measurable compression of a clay or of a concrete regardless of the compressibility of the aggregate.

Buoyancy expansion test

The buoyancy expansion test is used to determine the effective fraction x for the surface of contact between a plastic clay and the smooth base of a brass piston, while the clay stands under pressure. The test arrangement is shown in Fig. 7a. The sample of clay, *Cl*, is inserted between the upper surface of a saturated porous stone *St* and the bottom of the brass piston *P* whose weight *G* can be changed at will. The piston fits the inside of a cylindrical vessel *C* with a cross-sectional area *F*. The water in the voids of the stone *St* communicates with the content of a stand-pipe *S*, 600 cm. high. In one series of tests the water level in the standpipe is kept at the elevation of the bottom of *P*. In this series an increase of the pressure $q = G/F$ from zero to q_o causes a decrease of the thickness of the sample represented by the ordinates of the curve K_o in Fig. 7b. A subsequent decrease of the pressure from q_o to zero produces an expansion represented by the curve K_1. For a decrease of the pressure from q_1 to q_2 the expansion of the clay is equal to Δd. In a second series of tests the water level in the standpipe is kept at the level of the base of *P* during the entire increase of the pressure up to q_o and the subsequent decrease from q_o to q_1. Then the weight of the piston is kept constant at $G = G_1$ and water is poured into the standpipe *S* until the condition $hs_o = q_1 - q_2$ is satisfied. If the reduction factor x for the base of the piston is equal to unity there should be no difference between the expansion Δd of the clay produced by reducing the weight of the piston from G_1 to G_2 at an unaltered standpipe level and the expansion produced by filling the standpipe to elevation *h*, Fig. 7a, because the test was made in such a way as to satisfy the condition $G_1 - G_2 = Fhs_o$. In reality x is smaller than unity. Hence we obtain

$$\Delta d_1 = x\,\Delta d$$

or

$$x = \frac{\Delta d_1}{\Delta d}$$

The tests were made on a very fat tertiary clay from Paris in a stiff plastic state. The other data pertaining to the tests are: Diameter of the vessel $C = 10$ cm., $d_o = 1.5$ cm., $q_o = 5.0$, $q_1 = 1.0$ and $q_2 = 0.4$ kg. per sq.cm. The value x was found to about equal 0.95, in spite of the extremely low permeability of the clay and the relatively high pressure which acted on its surface.

Buoyancy crushing test

The buoyancy crushing test is used to investigate the influence of a hydrostatic pressure n_w in the water content of a clay or a concrete on the shearing resistance along any section through these materials and on the stress conditions for failure.

The method is based on the fact that the shearing resistance of the water is equal to zero under any pressure. If failure occurs by shear along any section through a cohesive, porous, saturated material, one part of the surface of rupture is located in the water and another part cuts across the solid. The frictional resistance has its seat exclusively in the solid. If the pressure in the water represents a negligible item, the shearing resistance t per unit of area of a section under a normal pressure n is equal to

$$t = c + n \tan \phi$$

wherein c = shearing resistance under zero pressure and $\tan \phi$ = coefficient of internal friction.

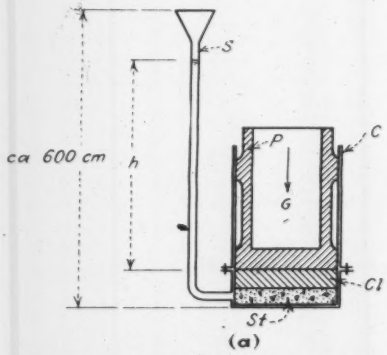
On the other hand, if the water in the voids of the material is under an appreciable pressure n_w, one part, xn_w of the normal pressure n' will not produce any friction, because this part is taken up by a pressure in the water. Hence the shearing resistance will be

$$t = c + (n' - xn_w) \tan \phi \qquad (2)$$

To obtain the empirical data required to compute the value x by means of this equation we take advantage of the fact that the failure of cylindrical specimens subject to an axial pressure always occurs by shear along rough, yet fairly plane surfaces at an angle ϵ to the direction of the axial force. Experiments have shown that the angle ϵ is nearly equal to $45° - \frac{0.9\,\phi}{2}$. The roughness of the planes of rupture is due to the fact that failure occurs along a section of minimum shearing resistance. Such sections are always uneven in detail.

Fig. 8 shows a section through the axis of a cylindrical specimen with a cross-sectional area equal to unity. By increasing the axial pressure q on this specimen to the breaking point failure occurs by shear along a fairly plane surface at an average angle ϵ to the direction of q with an area $F = 1/\sin \epsilon$. At the instant of failure the shearing force $q \cos \epsilon$ which acts along the plane of failure is equal to the shearing resistance. This shearing resistance is composed of two parts. One part, t per unit of area, is independent of q and the other is equal to $q \sin \epsilon \tan \phi$. Thus we obtain the equation

$$q \cos \epsilon = q \sin \epsilon \tan \phi + t \frac{1}{\sin \epsilon}$$



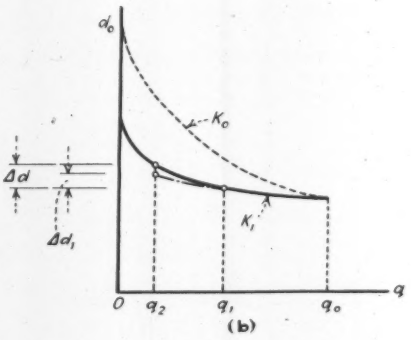


FIG. 7—(a) APPARATUS for buoyancy expansion test; (b) Curve K_1 shows the relation between the pressure q produced by the weight G and the corresponding expansion of the sample of clay, *Cl* in *a*. In a second series of tests the decrease of q is produced by filling the standpipe with water without changing the weight G of *B*.

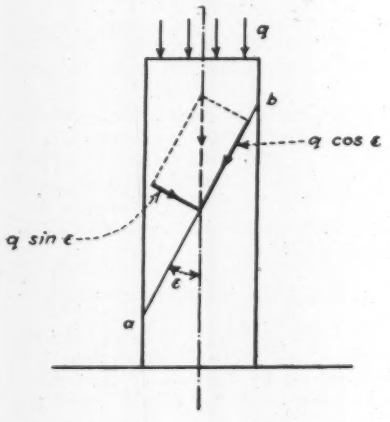


FIG. 8—NORMAL force and shearing force produced by an axial pressure q on the plane of failure *ab* in a cylindrical specimen.

$$\text{or } q = \frac{t}{\sin\epsilon\,(\cos\epsilon - \sin\epsilon\tan\phi)}$$

wherein $q = 45° + \frac{0.9\,\phi}{2}$. The denominator on the right side of this equation depends exclusively on the empirical value ϕ, which is practically the same for every test. Therefore we can replace the equation by

$$q = A_\phi \cdot t \text{ wherein} \qquad (3)$$

$$A_\phi = \frac{1}{\sin\epsilon\,(\cos\epsilon - \sin\epsilon\tan\phi)} = \text{const.} \qquad (4)$$

According to equation (2) the shearing resistance t consists of the sum of the shearing strength c and the frictional resistance $(n' - xn_w)\tan\phi$. The factor $(n' - xn_w)$ includes every normal pressure which may act on the plane of failure in excess of $q \sin\epsilon$, Fig. 8. Thus we obtain

$$q = A_\phi\,[c + (n' - xn_w)\tan\phi] \qquad (5)$$

In order to produce a normal pressure in excess of $q \sin\epsilon$ we introduce our specimen into the hydraulic chamber Fig. 6b and combine the application of the axial force q with the application of an all-sided pressure n. If the surface of the specimen is covered with a water-tight jacket with a discharge opening for the excess water, the hydrostatic pressure n_w in the water remains practically equal to zero for any value of n and equation (5) becomes

$$q = A_\phi\,(c + n\tan\phi) \qquad (6)$$

Tests of this kind are called tri-axial compression tests on drained specimens. On the other hand, if the water-tight jacket is omitted or if we test a completely saturated specimen enclosed in a water-tight jacket without any discharge opening, the all-sided pressure n produces a hydrostatic pressure of equal intensity in the water content of the specimen, whereupon the shearing resistance t then becomes equal to $c + (n' - xn_w)\tan\phi = c + n(1 - x)\tan\phi$ and the axial pressure required to produce failure is

$$q = A_\phi\,[c + n(1 - x)\tan\phi] \qquad (7)$$

This is the equation describing the results of the tri-axial compression tests on undrained specimens. In order to determine the value ϕ, a series of tests on drained specimens is made. A second series performed on undrained specimens furnishes the data required for computing the value x.

Tri-axial compression tests on drained specimens of concrete were made by a great number of investigators, including Brandtzaeg at the University of Illinois and Ros at the Polytechnikum in Zurich. All of these tests led to the conclusion that the value of ϕ decreases slightly with increasing values of n. The average value of ϕ is about equal to 34 deg. corresponding to values of $\tan\phi = 0.675$ and $A\phi = 5$. Hence we obtain for concrete the approximate empirical equation.

$$q = 5\,[c + 0.675\,n(1 - x)] \qquad (8)$$

The tests performed in the laboratory of the author in Vienna were limited to undrained specimens with a height of 20 cm. and a diameter of 7 cm. Table I contains the most important data concerning the concrete and Table II the test results. According to Table II an increase of n from zero to 400 kg. per sq.cm. acting on an undrained specimen produced no noticeable increase of the value q. For drained specimens, the increase Δq of q associated with an increase of n from zero to 400 kg. per sq.cm. can be computed from equation (6) by introducing the values $A\phi = 5$ and $\tan\phi = 0.675$. Thus we obtain

$$\Delta q = q_{n=400} - q_{n=0} = 5\,[c + 0.675 \times 400] - 5c = 1350 \text{ kg per sq.cm.}$$

Hence the value of Δq is equal to about 1,350 kg. per sq.cm. for drained specimens against a negligible value for undrained specimens. This fact alone shows without any further computation, that the value of x was practically equal to unity for all the specimens tested.

Similar tests were made with a plastic Tertiary clay from Vienna. The value of ϕ was found to be equal to 24 deg. Table III contains the data obtained from tests on undrained specimens. Each numerical value represents the average of three individual tests. Although the clay contained some air, the value of the reduction factor x was close to unity.

The results shown in the Tables II and III lead to the conclusion that the frictional resistance produced by the neutral pressure n_w is negligible, regardless of the value $\tan\phi$ of the coefficient of shearing resistance.

TABLE I—DESCRIPTION OF THE CONCRETE USED IN THE TESTS

Series	Weight of cement in kg. per cu. m. of finished concrete	Water-Cement-Ratio in per cent	Age of Specimen of in days	Dry weight of Concrete in kg. per cu. m.	Volume of voids of Concrete in per cent	Volume of voids of the cement in per cent
I	600	44	60	2280	13.4	34.3
II	400	56	60	2265	13.9	44.8
III	236	100	65	2210	16.2	61.9

TABLE II—TRI-AXIAL COMPRESSION TESTS ON UNDRAINED CONCRETE SPECIMENS

q = Axial Excess Pressure at Failure

Water pressure n. in kg. per sq. cm.	Value of q in kg. per sq. cm.		
	Series I	Series II	Series III
0	580	532	66.3
100	630		67.8
200	646	534	67.0
300	404	654	66.5
400	604	454	67.1

TABLE III—TRI-AXIAL COMPRESSION TESTS ON UNDRAINED PLASTIC CLAY SPECIMENS

q = Axial Excess Pressure at Failure

Water pressure n in kg. per sq. cm.	q kg. per sq. cm.	Reduction factor x
0	0.67	
2	0.75	0.97
6	0.85	0.985

Cause of the high values of x

The high values of x obtained from the tests seem to be due to the fact that the compressibility of the water and of the solid constituents of most porous materials including clay and concrete is extremely small compared to the compressibility of the entire aggregate. Hence the greatest part of the compression produced by a change in the state of stress is due to a reduction of the pore space associated with a deformation and a relative displacement of the solid elements. If a pressure is applied in such a fashion that it acts in the solid and in the liquid with equal intensity every particle is slightly compressed without changing its shape and its position with respect to its neighbors. Therefore the corresponding compression and all the phenomena associated with compression, such as the increase of the shearing resistance, are negligible.

Conclusions

1—The shearing resistance t per unit of area of a shearing plane in a saturated, porous material is equal to

$$t = c + (n' - xn_w)\tan\phi$$

wherein c = shearing resistance at zero pressure, n' = total normal pressure, x = reduction factor, n_w = pressure in the liquid and $\tan\phi$ = coefficient of shearing resistance. The paper contains a description of three independent methods for determining the value x. Each one of these methods is simple enough to be used in any materials- or soil-testing laboratory. When undrained specimens of clay or shale are tested, care should be taken to exclude air from the voids of the specimen.

2—For concrete and for plastic clay the reduction factor x was found to be practically equal to unity which indicates that the hydrostatic uplift in these materials is almost as active as it is in a sand.

3—The strain in clay and in concrete exclusively depends on the differences between the total stresses and the neutral stresses. In every point of the saturated material the neutral stresses act in every direction with equal intensity and they are equal to the pressure in the water at that point.

Concrete Placing Machines Line 92 Miles of Tunnel

Five types of machines place air and pump driven concrete lining in the seventeen tunnels of the Colorado River aqueduct

CONCRETE LINING in side walls and arch of the Colorado River aqueduct, referred to as "arch" lining in records of the Metropolitan Water District of Southern California, has been completed in about 47 per cent of the 92.04 miles of tunnels. Up to June 1, 1936, 802,764 cu.yd. had been placed in 43.05 mi. of lining. This work is being done exclusively by mechanical equipment and now is at peak activity with the several types of concrete-placing machines well adjusted to the work and with operating crews well broken in.

In nearly all of the tunnels the continuous-pour method has been followed, that is, no end forms are used. Forms for 100 ft. or more are set up at the start and when concreting commences it is expected to continue without interruption; as fast as more forms are needed they are brought up, a section at a time, from the far end and set up on the forward end of the assembly. Afterward the invert is poured.

As concrete is delivered its advancing slope or angle of repose in the side-wall forms automatically becomes that which naturally results from the consistency of the concrete. The actual length of the slope within the forms varies from 60 to 90 ft., depending upon the slump, which in some cases is influenced by the effect of the placing machine on the stiffness of the mix. When the day's pour is completed the only treatment given the sloping surface to prepare it for the next succeeding pour is to trowel up a narrow band or curb next to the form. The result of this is to smooth out irregularities against the wall form and to raise the concrete edge slightly above the level of the adjoining surface so that the smoothed edge strikes the steel form at an angle of about 30 deg.

This hand troweling is said to be so effective that an excellent joint is obtained when the next pour has been placed. On such cold joints the first succeeding pour consists of sand and cement with a small amount of stone of the smallest size specified. After the forms are stripped ordinarily the joint shows as a fine line with no signs of honeycombing along the contact. Although this ideal bonding has not been obtained in some cases where new equipment was being adapted to the work, it has prevailed throughout the job and where any considerable amount of honeycombing has occurred at joints, subsequent surface treatment (after removal of the forms) has been required of the contractor.

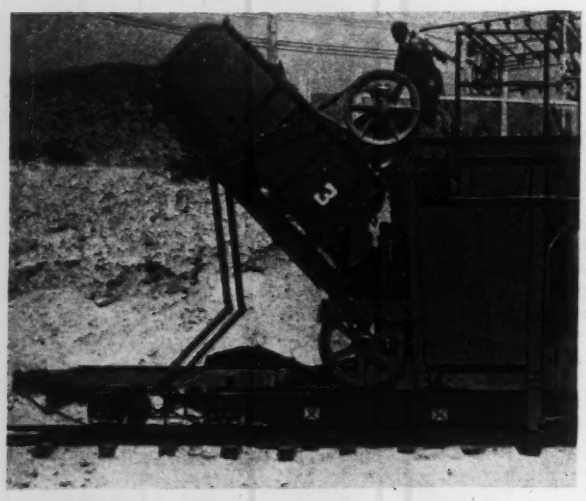
One contractor has successfully used bulkhead forms instead of continuous pours. This was necessary in his case because his forms are of the non-telescoping type; the workmanship has been satisfactory to the district and economy is claimed from the method.

Where concrete placing is continuous, preference usually is expressed for equipment and methods that will place concrete as rapidly as possible. This lessens the risk of getting visible joint planes—a result to be expected when the slope surface has time to stiffen up somewhat between successive arrivals of fresh concrete. Thus there is a premium on the larger-capacity placing units, within certain limits, which can be used effectively in the tunnels. No units of less than 1-cu.yd. capacity are in use.

The usual technique of placement is to keep the end of the discharge pipe embedded in the fresh concrete on the crown of the arch and to move it backward and forward more or less continuously as the work progresses. By controlling the position of the discharge line concrete can be forced upward and outward to fill fissures in the rock and overbreak spaces or it can be allowed to flow more freely when it is desired to add to the slopes in the side walls. In other words, the depth to which the discharge end is embedded in the concrete is proportioned to the pressure to be built up in the concrete mass at the end of the pipe to fill the rock irregularities around the concrete lining at this point.

Most of the placing machines, of whatever type, have a mixer mounted on the unit which operates in the tunnel but a few are served by mixers operated just outside the tunnel portal. In general two types of machines have been used for placing arch lining. These are the so-called "gun" or placer which intermittently delivers batches of concrete with compressed air as a motive power, and the "pump" which forces concrete through the delivery pipe in a pulsating flow maintained by a piston moving in a cylinder supplied with concrete between piston strokes. Twin cylinders in parallel are used in large units

Unlike other types, the pump does not put an entire batch of concrete under delivery pressure all at one time. The



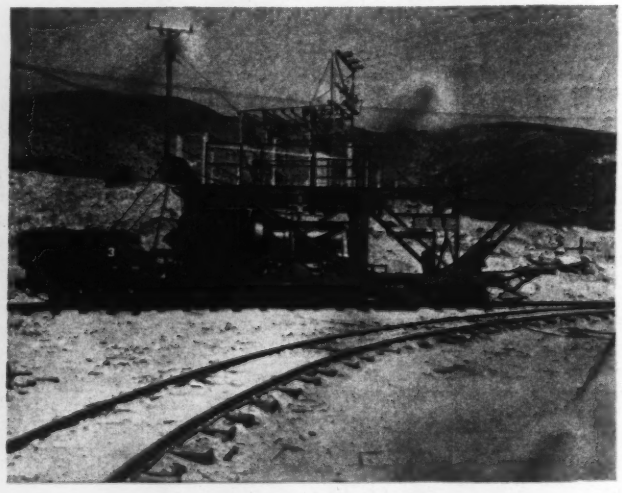


FIG. 1—PISTON FEED PUMP UNIT: Left shows a 3-batch car charging the mixer and right shows entire unit; the horizontal cylinder in front of the mixer is the agitator unit; the pump is below the forward end of the agitator, concealed by car frame; the discharge pipe is carried by the boom.

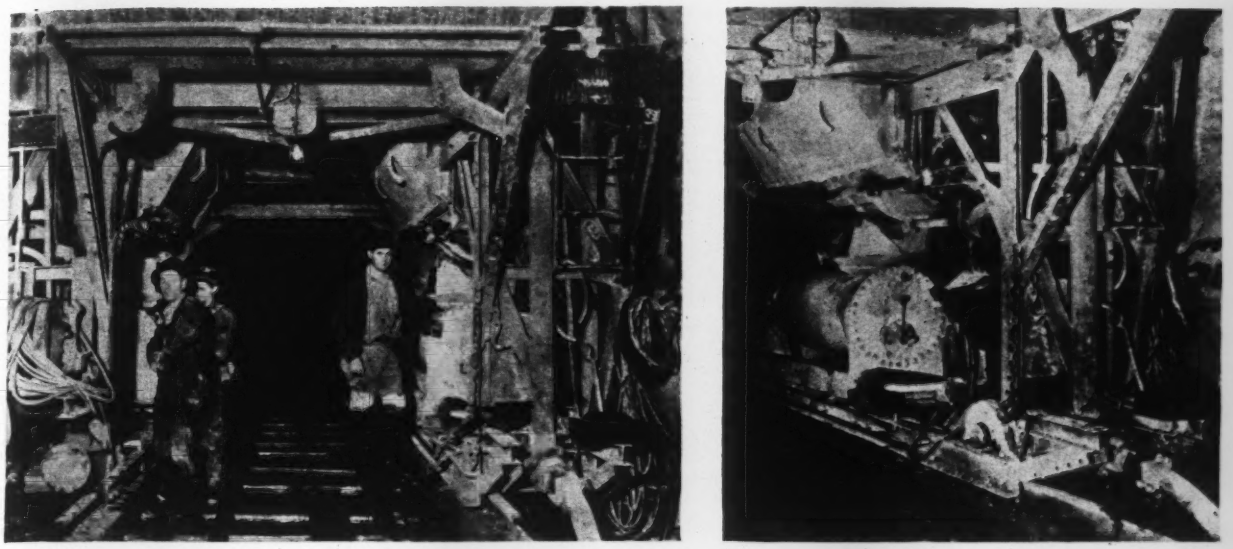


FIG. 2—SCREW-FEED CONCRETE GUN: Left shows a pair of guns, one of ½-cu.yd. capacity on either side of track, each having its own 6-in. discharge line complete; right shows concrete discharging from the hopper into one of the guns.

relatively small cylinder in which the piston operates is filled many times for each cubic yard delivered. Thus it is desirable to maintain an agitated source of concrete supply so a homogeneous concrete mix will be kept ready for delivery into the cylinder and thence into the delivery line. It is to be noted that under this method the positive action of the piston puts hydraulic pressure on the discharge line as distinct from the pneumatic pressure used by the other types.

The term "gun" (used to describe all types other than the pump), is a misnomer in that there is nothing explosive about the process nor is there any scattering of the discharge now that modern methods of placement keep the end of the discharge pipe embedded in the concrete. There is a prevalent opinion that the use of compressed air in direct contact with the concrete somehow has the effect of stiffening the mix to some extent; flow tests before and after passing through the guns are said to show the mix to be somewhat stiffer as delivered to the forms than it was before entering the gun chamber.

In the early work excessive wear at curves of the delivery pipe caused frequent shutdowns for replacing worn-out bends. In this item of equipment (common to all types of placement machines) there has been great improvement; what was once a serious problem now is a minor item. The solution has been (1) increasing the radius of bends in the discharge pipe, (2) making bends of a steel alloy particularly adapted to resist wear and (3) design for quick and inexpensive replacement of wearing parts in the outer periphery of bends where most of the wear is concentrated. Thus there is now little delay on this account. One manufacturer has equipped bends of the delivery pipe with replaceable blocks of metal which have a Brinell hardness of 600 and which can be changed between shifts and without taking down the pipe. Ordinarily such pipe parts will continue to be serviceable for about 10,000 cu.yd. of concrete.

Essential properties of concrete specified for use in the arch are not affected by close clearances in the forms because there is no steel in the arch lining. Thus, considerations influenced by the type of placing equipment were the more important elements in fixing limitations. The district has set up a common specification, which calls for four aggregate sizes as follows: between 0 and No. 8 screen, 24 to 32 per cent; between No. 8 and ⅜-in. screen, 5 to 16 per cent; between ⅜- and 1-in. screen, 24 to 36 per cent; between 1- and 2-in. screen, 29 to 42 per cent; water cement ratio 1.02 to 0.85; flow 4 to 5½ in. and minimum 28-day strength 2,500 lb. per sq.in.; mixing time at least 1½ min.

Direct labor operations standardized on concrete pumps

In tunnels on which work is being done by force account the district has eight Pumpcrete machines (Fig. 1). All deliver through 7- or 8-in. discharge pipes from a unit in which a concrete mixer is an essential part. The equipment at Wide Canyon, from which point a total of 11 miles of aqueduct tunnel is being lined, is typical. In the following outline of features of pump operation, all mention of a specific installation refers to Wide Canyon.

The unit taken into the tunnel at this point includes, essentially, (1) the concrete pump itself which is a cylinder with a 12-in. stroke and a diameter of slightly less than 8 in.; (2) a mixer-agitator much like the mixing drums used on trucks which deliver ready mixed concrete; (3) a 1-cu.yd. nontilting concrete mixer and (4) a three-compartment batch-box lifting mechanism that charges the mixer from batch boxes brought in on supply trains. These items plus control equipment and accessories, such as a compressor to supply air from the discharge line, as noted later, are mounted on a jumbo 26 ft. long weighing about 15 tons. The jumbo is closely followed by a trailer carrying an oil-hydraulic hoist for lifting and dumping the batch boxes.

The steel forms for use with the pump are in sections 24 ft. long; seven such sections are kept on the job, permitting a complete set-up for 168 ft. of arch. The 8-in. delivery pipe from pump to forms is 150 ft. long, a length that has been found about right for maintaining desirable conditions of delivery. The end of the delivery pipe which rests on the forms rides on a guide frame moving with the pipe between pins thrust up through the steel lining in openings in the arch provided for this purpose. The pins are removed just ahead of the advancing concrete.

Experience in controlling the movement of the jumbo and its connected length of discharge pipe is said to make placement so effective that vibration is unnecessary; careful spacing and ramming are all that is required to give a wholly satisfactory job. Although only one shift was used in the earlier stages of the work, more recently the operation has been continuous on the long runs, thus avoiding the necessity for troweling up a finish on the slope where a cold joint otherwise would have to be made.

The mix for the pump includes four grades of aggregate adapted to maximum density and 520 lb. of cement to a 1-cu.yd. batch. To this combination of dry materials is added 37 gal. of water per batch. Some clogging of the delivery line occurred when this equipment was started with the concrete mix

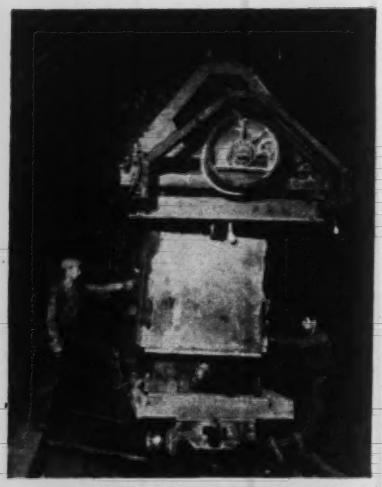


FIG. 3—A PNEUMATIC GUN: Top is a rear view, the batch box is being lifted from car to be raised above the cars adjoining, and moved forward and dumped into the mixer; center is a front view, the mixer is discharging into the gun at a lower level and thence to the discharge pipe in the foreground; bottom is a view ahead from gun, showing the 6-in. discharge pipe rising to the crown.

specified but this clogging lessened with experience, particularly after the original 7-in. discharge line was replaced by an 8-in. line and a 1½-in compressed air pipe was attached about 20 ft. back from the discharge end. Through this pipe air is admitted at 100 lb. per sq.in. pressure whenever it is desirable to relieve the load on the pump and help in clearing the long discharge line. Also this air jet is said to give the concrete additional velocity which aids in effectively filling spaces in the rough tunnel section.

Experience with this equipment indicated that it was desirable to keep two of the pump units on the job so that maintenance and repair work could be done without interrupting operations in the tunnel. A typical average progress has been about 161 lin.ft. of arch per three 8-hour shifts. With 3.8 cu.yd. of concrete per linear foot of tunnel this gives an average of about 612 cu.yd. per day.

Four types of concrete guns used on contract work

The concrete chamber of the Ransome gun (Fig. 2) is a horizontal cylinder in the bottom of which a screw conveyor, driven by a motor outside the chamber, continually advances concrete and forces it into the entrance of a 6-in. discharge pipe. Air pressure in the cylinder supplements the conveyor in maintaining constant flow into and in the delivery pipe. Ordinarily built in ½-cu.yd. sizes as a maximum, guns of this type are used in pairs on the Colorado River aqueduct to meet the need for equipment of at least 1-cu.yd. capacity.

The Press-Weld gun of 1-cu.yd. capacity (Fig. 4) consists essentially of a horizontal concrete chamber, arranged for pneumatic pressure, containing a plate or false bottom whose rear end is hinged. A long lever, so placed that it can be moved conveniently by the operator's foot, enables the false bottom to be moved on this hinge. At convenient intervals, determined by conditions of operation, the operator manipulates the foot lever to insure access of air to the concrete.

Air is admitted to the concrete chamber at three points: (1) by a single pipe just back of the discharge line, (2) by a somewhat larger pipe at the rear of the concrete chamber behind the hinged vane or flap in the bottom of the chamber and (3) by a pipe at the hinge in the flap. Control of operation is centered in a three-way valve with a single lever which first (1) admits concrete to charge the main chamber, (2) closes the door through which concrete enters and (3) admits air to the three pipes that put the concrete chamber under pressure. This gun has a 6-in. discharge line. During 1935 this equipment was used for lining 3.02 miles of tunnel.

Hackley guns (Fig. 3) of 1- and 2-cu.yd. capacity had been used in five of the aqueduct tunnels up to April 1, 1936. With this gun there is a cantilevered overhead track projecting over cars of the supply train on which dry materials are delivered in 42-cu.ft. bottom dump batch boxes. These batch boxes, one at a time, are lifted by the overhead crane from any part of the supply train, raised to a height sufficient to clear the boxes remaining on the train and are moved then to a point whence they can dump directly into the concrete mixer. The mixer is set at a level just above the gun chamber. When the door to the gun chamber is opened the mixer discharges directly into it, the door is replaced and air pressure is applied successively at several points along the bottom of the chamber whose vertical cross-section is egg-shaped with the narrow end at the bottom. Thus the concrete is made to flow uniformly and smoothly into a 6-in. discharge pipe usually about 90 ft. long. As the concrete is placed the unit backs away from the forms. The far end of the discharge pipe rides on a sled supported by the forms at the top of the arch.

Steel forms are made up in 20-ft. sections and ten of them usually are kept on each job. Ordinarily they are set up at one time as soon as a 20-ft. space is clear between the gun and the previous set-up. The forms are stripped and moved ahead after concrete has set not less than 10 hours.

Progress with this gun has ranged up to 700 cu.yd. per day of three 8-hour shifts. In the last ten days of work in the West Eagle Mountain tunnel a 1-cu.yd. gun of this type lined 2,100 ft. of tunnel arch. With a similar gun of 2-cu.yd. capacity a total of 900 cu.yd. has been placed in the arch in a single day's work. This record was made on the Cottonwood tunnel.

A novel combination of a concrete mixer and pneumatic gun was first used on the Mecca Pass tunnel. This equipment was used only on this one tunnel. Essentially the unit was similar to a standard concrete mixer mounted on a jumbo, taken into the tunnel to the point where concreting was under way and there connected to the delivery pipe. With a mixer so arranged, when mixing was finished, air pressure could be admitted to the mixing drum to force the batch out through the delivery pipe and into the forms. The jumbo was equipped with an incline so that a train of cars could be moved on rails to an upper level whence they could dump directly

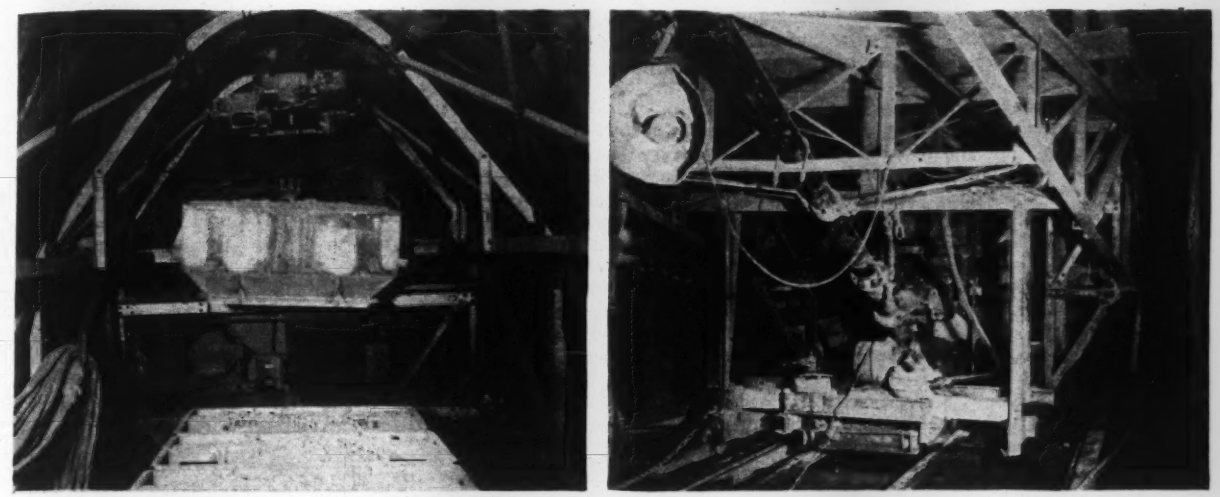


FIG. 4—HINGED FLAP pneumatic gun. A is a rear view showing the batch box en route to the mixer and other batch boxes on the car below; B is a front view showing the discharge pipe and framework of the concreting unit.

into the concrete mixer as required.

One feature of this gun about which interest centered was the packed joint connecting the mixer, which rotated, with the delivery pipe which of course did not rotate. Obviously, such a joint required more or less frequent attention to keep it tight under operating conditions.

The original plan of operating this equipment soon was revised to include a batch mixer outside the tunnel for mixing the material dry, thus lessening the amount of rotation required in the mixer-gun chamber. This was not wholly satisfactory and finally the arrangement again was changed so the concrete, wet, was mixed completely on the outside of the tunnel and delivered to the gun ready to be forced directly into the forms. Thus the function of the mixer in the placement unit became purely that of a rotating chamber in a pneumatic gun. On the Mecca Pass tunnel this equipment lined a 1.13-mile length of arch placing a total of 19,106 cu.yd. of concrete.

Hotel Plumbing Revamped For Waterworks Convention

Back-siphonage preventors installed, cross connections eliminated and overhead sewers in commissary abandoned following inspection by sanitary committee of the AWWA

FOLLOWING the greatly publicized epidemic of amoebic dysentery during the Chicago Century of Progress in 1933 which was traced to sanitary defects in two Chicago hotels, the American Water Works Association prescribed stringent inspection and requirements as to water piping and sewers in all proposed convention meeting places. The Chicago epidemic resulted in 1,409 cases and 98 deaths affecting 400 cities in 43 states, Hawaii and three Canadian provinces; AWWA officials determined to teach the hotel managements desiring their patronage that they would not tolerate cross-connections between drinking-water lines and polluted lines, back siphonage, or overhead sewers in commissaries. Few hotels are free from some of these defects. Thousands of dollars were spent last year to put the plumbing in the convention hotel into proper sanitary condition. This year at Los Angeles a sanitary engineer under the direction of the committee inspected the hotel and laid down in a 22-page report the essential changes to be made. That the inspection was no perfunctory, slap-dash performance is indicated by the fact that three weeks of actual time was consumed in the investigation. The investigation included a thorough study of the blueprint plans of the hotel and checking with the existing piping and equipment, numerous vacuum pressure records from the water system, direct inspection of plumbing, water piping and equipment and laboratory testing of the types of flush tank valves used in the hotel for back-siphonage possibilities. The following notes are taken from the committee's report and recommendations.

The building, a limit-height (13 stories, 1,372 rooms) structure, is supplied solely by four large city water services, one 8-in. for fire service only and three 6-in. lines for domestic service, which are combined in the sub-basement into one 8-in. main city water supply. This 8-in. water supply line leads into a 10-in. header which discharges into the top of a large surge tank in the sub-basement. However, this header is valved in such a manner that the water supply for the hotel is by-passed through three filters and then through three softeners before the water again reaches the header and is spilled from overhead into the surge tank. Under normal operation all water for the hotel is filtered and then softened; untreated city water is never used except in emergency. From the surge tank the water is piped to the suction side of the house water supply pumps and is pumped under 190-ft. maximum head (82-lb. pressure) to two sets of twin house tanks.

Water from the house tanks is taken into a 10-in. main supply pipe and extended downward into the attic. In the attic this 10-in. pipe is connected to an 8-in. horizontal supply main extending to all attics of the building. This supply main is reduced at certain points to 6-in., 5-in. and 4-in. mains. From this main supply pipe, "drop-leg" supply pipes or risers extend downward to supply the toilets, wash basins and bathtubs on each floor, also the service sinks, slop hoppers, etc.

The bathrooms are placed in columnar formation, the bathroom on one floor being directly above or below corresponding facilities on other floors. There

are 75 risers in the entire hotel and each riser supplies a column of bathrooms as it extends downward from the attic to the first bedroom floor.

The drinking water (i.e., ice water supply) is a separate system, entirely independent from the general house supply. It receives its supply direct from the roof tanks which are filled with water from the filters located in the sub-basement. These filters are a series of two which are separate from the previously mentioned house filters. After leaving the filters the water is cooled by refrigeration and pumped to the upper floors where it is piped to each room in a manner quite similar to the general house supply, except that it is a recirculated system which supplies ice water to the room taps at all times. This system is ideal for a hotel of this type, and does not merit criticism in any respect. The hot water system is almost identical with the above described ice water system except that it is recirculated by gravity instead of circulating pumps. The hot water system receives its supply direct from the roof tanks through two 5-in. supply pipes to three large steam-heated water heaters in the sub-basement.

The plumbing fixtures in this hotel, while not strictly up-to-date, are of the better type in common use at the present time in most buildings. There are two makes of toilet flush valves. The diaphragm type is used throughout in the original building. The piston type is used in additions. The bathtubs are modern with the water inlet about 2 in. above the rim of the tub, the nozzle projecting from the wall of the bathroom. The wash basins are the ordinary wall-hung type with a combined hot and cold water inlet. This water inlet is approximately ½ in. below the rim of the basin in all cases, but large overflow vents are placed more than ½ in. below the inlets. There is an ice water tap in every room, placed about 12 in. above the basin. The above described fixtures are standard in all rooms, except that in some rooms there are stall showers in place of bathtubs. All sinks and slop hoppers throughout the entire building are of the usual type with separate hot and cold water inlets from 6 to 12 in. above the rim of the fixture.

Committee recommendations

The hotel is comparatively free from the ordinary types of cross-connections and imperfections in sanitation facilities; nevertheless, there are certain conditions that should receive attention, the report states, and recommendations concerning these are given.

Flush Valves — Numerous vacuum pressure recordings taken at different points in the water distribution system have shown that momentary vacuums and low pressures occur at frequent intervals throughout the day. Also when a riser is drained occasionally a high vacuum is created in the riser. These vacuums are especially dangerous at the upper floor levels.

Valves operating at pressures less than 15 lb. per sq. in. are likely to siphon adjoining toilets one into the other and to teeter. Pressure gauge readings indicate fluctuations on the top three floors where the pressure at times falls below 15 lb. per sq. in. On the lower floors the static water supply pressure increases, which makes the valve operations at the lower floors more positive. Yet, should any of the risers be closed at the top to permit draining them all toilets would siphon back into the risers being drained.

While air inlets should be installed on all flush valves in the hotel thoroughly to protect the water supply, for the purpose of the American Water Works Association convention the installation of air inlets on all flush valves on the ninth, tenth and eleventh floors would be acceptable to this committee provided the riser valves on the top floor are kept locked and inspected during the convention. [Back-siphonage preventors have been installed on 272 toilets on the top two floors which the committee, after making extensive tests, concluded should be so equipped.]

Filter and Softener Cross-Connection —The waste lines from both the water softeners and the filters enter a common 8-in. line which connects direct with an 8-in. sewer on Grand Ave. at an elevation 25 ft. above the filters. The 8-in. line has a check valve for supposed protection. The next manhole above this sewer connection has a ground surface 38 ft. above the filters. It is apparent that a positive sewage head may back down to the filters, and this connection should be entirely eliminated. The waste discharge from the softener and the filter should be connected to an existing 5-in. line now used as a drain for sandwashing operations, which connects to the main sump in the engine room, where ejectors pump various waste waters to the sewer. [A tank and pump were purchased, the committee states, so that the filter drain could be broken, thus eliminating direct connection between the house water supply and the street sewer.]

Overhead Sewer in Ice Room—All of the ice for the use of hotel guests and employees is manufactured and stored in a room adjoining the engine room in the sub-basement in which there is one 1,500-gal. open tank of water which is used in the making of ice and in which there are open freezing vats at one of the floor levels. Along one side of this room near the ceiling is a 6-in. wrought-iron pipe main sewer with "Durham" fittings which passes directly over the open tank. This sewer receives wastes from a double column of bathrooms on thirteen floors. It has a wye directly over the open water tank which branches into the engine room. The sewer extending along the wall past the wye continues through the wall to a cleanout just on the other side. There are large openings where both branches enter the ice room. This pipe arrangement is against all good principles of sanitation. Leakage from any of the joints would either fall into the water tank which supplies water which is made into ice or on to the floor, where it would enter freezing vats or contaminate ice standing in the room. This line is painted and appears to be in good condition. Ultimately this sewer will have to be moved and routed through the engine room outside of the ice room.

Overhead Sewers in Kitchen—The hotel public toilets for men and women, consisting of four toilets in each unit, are located over the kitchen. Both units are served by 4-in. wrought-iron pipe with "Durham" fittings with a total length of 20 ft. to each unit entering a 6-in. vertical stack inside of one of the building columns. Twelve wash basins and four urinals are served by this part of the drainage system. The horizontal portion of the drainage system lies between the false ceiling of the kitchen and the floor above.

The horizontal sections of the drainage system pass over stoves, utility tables and food preparation tables. Should any of the joints leak, breaks occur in the drain lines, or should spills occur during cleaning at any of the fifteen cleanouts on this part of the drainage system, pollution of foods under preparation for human consumption would be inevitable. The sewers at present are in good watertight condition. Obviously, good sanitation would require location of the sewer drainage lines outside of the kitchen entirely, including false partitions and false ceiling. Eventually these sewers will have to be relocated. [The ice room and kitchen overhead sewers will be put under special inspection during the convention, according to the committee.]

Sewer in the Commissary—There is a 4-in. vertical sewer against one of the columns in a corner of the commissary just below the ceiling which branches into a horizontal sewer serving kitchen sinks on the floor above. There is one cleanout in this part of the drainage system in the commissary room. The location of sewers in the commissary is a serious defect. At the present time the space under this sewer is used for the storing of dry breakfast food cereals. [The committee reports that the overhead sewer in the commissary has been abandoned.]

Swimming Pool Cross-Connections—About a year and a half ago the Bureau of Water Works and Supply dequired the hotel to eliminate a 4-in. water connection to the discharge side of the circulating pump on the swimming pool. The engineer of the hotel eliminated this cross-connection to the city supply and thereby met all of the requirements of the ordinance which the Bureau of Water Works and Supply enforced. However, he elected to connect the discharge side of the swimming pool to

one of the risers supplied from the roof tank. This riser connects to a horizontal header supplying the hot water heaters at a point below the top of the swimming pool. This hot water system supplies the entire hotel with hot water for basin and bathtub purposes. The engineer was advised at that time that while such a connection met the existing ordinance that the Bureau of Water Works and Supply was enforcing, it did constitute a cross-connection, contrary to good sanitary practice. [The connection has been abandoned.]

The sanitary committee for the Los Angeles convention included C. G. Gillespie, chief engineer, California State Board of Health; R. F. Goudey, sanitary engineer, Los Angeles Bureau of Water Works and Supply, and Norman F. Slane, sanitary inspector also of the Bureau. This committee reports to the convention management committee, of which W. W. Brush is chairman.

REGULATING TRANSPORT—II

First Principles

By John S. Worley
Professor of Transportation Engineering, University of Michigan, Ann Arbor, Mich.

WHILE REFUSING in the previous article (*ENR*, June 11, 1936, p. 837) to accept any contention that a crisis existed in the affairs of transport that constituted a national problem it was pointed out that problems of regulation had to be considered. These problems naturally differ for each transportation agency as will be discussed later, but there are principles and a philosophy which apply in all regulation and it is vital that they should be clearly understood. It is the purpose here to consider what regulation should be fundamentally.

Definition and principles

1. Regulation is for the public good and is never warranted for the benefit of another transportation agency.

Regulation is of two distinct sorts: (1) regulation of those matters which have to do with economic or business phases, such as the rates to be charged for the service, the quality of the service, the allowable profits, the amount and kind of securities to be issued, uniform accounting systems and annual reports; and (2) regulation which has to do with the operation of the physical property, with particular reference to safety of operations as it affects employees, passengers and the public, and with the convenience of the public where public property and public highways are used.

Commissioner Eastman, of the Interstate Commerce Commission, in his recent report recommending to Congress the passage of certain regulatory bills with reference to transportation agencies, clearly set forth the fundamental principle of regulation, when he said:

It is clear that no regulation or restriction should be imposed upon any form of transportation merely for the purpose of benefiting some other form of transportation. The test must be the public interest. On the other hand, whatever the public interest may require ought to be done no matter how it may affect private interests.

Expanding the above into more comprehensive and detailed statements, we have the following:

1. Regulatory measures should be adopted and put into force and effect only when there is a strong probability of a public benefit; they should seldom, or never, be made effective as an experiment to see what would happen.

2. A minimum of regulation should be exercised by the government at all times and the number of regulatory laws should be the least possible required for the public good.

3. Regulation should never be enacted upon the theory that such action has any special virtue in itself. Articles, legal briefs and other documents not infrequently carry the implication that regulation should be enacted and made effective for the purpose of conforming to some alleged fundamental principle which is exclusive and separate from our social structure.

4. In the past it has been the general practice to institute regulatory measures for the benefit of the user of a public utility and in the transportation business upon complaint of consignors or consignees. Proposed legislation and regulation not predicated upon complaints or petitions of shippers, should be most carefully scrutinized before being adopted.

5. The specific regulation of one business is no criterion for the regulation of another business, either in kind or amount.

6. The adoption of regulatory measures should be dependent upon the kind and volume of the business which it affects. The public benefits should exceed or at least equal the costs of administration.

7. The fundamental principle of regulation in the public interest has generally been and should be restraint and permission and not initiation. The minute regulation departs from the policy of restraint and permission, it at once injects itself into managerial affairs, which, all experience to the present time indicates is not in the interest of the public utility or of the public.

It is true that difficulty is encountered in defining public benefit and there can be, and is, a difference of opinion: but a careful consideration of all the facts will reduce that which is doubtful to a very small amount. The definition of public benefit, of course, includes the public as a composite whole and where there is a benefit to the majority of the public at the expense of the minority, the loss to the minority must be carefully weighed.

Preliminary to such legislation and regulation should be extensive studies of the needs of such enactments and of their content. Where legislation and regulation exists, studies should be made to determine to what degree existing regulation is no longer in the public good and should be repealed. This latter study, of equal importance to the former, has received little or no attention.

Dangerous growth possible

2. Regulation feeds on itself and grows constantly greater unless it is held in check.

As one studies the history of legislation and regulation he is impressed with the one thread of purpose which runs through the whole fabric; it is the effort to find additional legislation which can be enacted and additional regulatory measures which can be promulgated. This tendency towards the expansion of regulatory measures is found in the whole history of the Interstate Commerce Commission and in the history of every state public utility commission. Their record is one of continuous expansion and promulgation of regulatory measures. Extensive research, with the expenditure of large sums of money, time and effort, is made so that additional regulatory measures may be enacted; but no similar effort has been put forth to curtail existing legislation or regulatory measures, the repeal of which would be in the public interest.

The record of regulation impresses the fact that its philosophy is expansion. This philosophy is so universal and so

clear that at times one is led to believe that regulation instead of being solely an agency for public good is instituted and administered for the purpose of regulation itself and that it is thought to be a thing separate and apart from our social and political structure, to which society should be made to conform. At times one is inclined to feel that in the eyes of many administrative officials it has the aspects of religion.

In deliberation and study preparatory to the adoption of regulation of any kind, it is often assumed that where regulation has been effective in a similar line it should be effective for the particular business under consideration. In formulating regulatory measures a comprehensive study of the regulation of all similar business will be of great help, but to act upon the theory that one business should be regulated either in kind or amount because a similar business has been regulated is a false premise and should be dismissed. Where the principle is adopted that regulation shall be established only when it is in the public interest, it is no longer necessary to give consideration to the regulation of other similar businesses. To establish regulation because another business is being regulated and where there would be no public good, is entirely contrary to the guiding principle of regulation.

As applied to transport regulation, the principle of restraint is more closely adhered to than in legislation relating to other matters. The theory of restraints is predicated upon complaints of users and, as a rule, where there is no complaint it is possible no regulation should be promulgated.

Unfortunately, there has been injected into our state and federal regulation of public utilities and transportation agencies practices that go far beyond mere restraint. In many instances they have taken on directorial and managerial aspects, that are extremely destructive in their effects. Once these practices are started they continue to expand and grow. Members of a governmental bureau feel frequently they are more competent to direct the affairs of the public utility or transportation company than the executives themselves, and with the governmental power which has been placed in their hands they continue to expand their activities and interfere with the management of the property. As this goes on the executives of the public utility or transportation company are not able to resist the debilitating effects and after a period of years we find them with little or no initiative and control over the welfare of the properties which they manage.

With a clear understanding of the foregoing principles we can make an intelligent study of each transportation agency with a view to becoming better informed as to its efficiency.

(The following article will consider some of the problems of the railways)

Hydraulic Fill at Quabbin Dike

Contractors plant for placement of 2,000,000 cu.yd. of embankment for Boston water supply dam by full hydraulic method developed after careful study of three suggested plans offered by engineers

IN THE CALL for bids on the construction of the Quabbin Dike, the first of two earth dams that will complete Boston's new Quabbin reservoir water supply system, the Metropolitan District Water Supply Commission engineers presented to prospective bidders three carefully-planned suggested operations for hydraulic-fill construction. These plans included full hydraulic placement by sluicing of borrow pits to a collection basin and pumping into the dam; transportation of dry materials by truck to hog boxes on the abutments, and monitor jet mixing with gravity delivery through pipe line to the dam; and a similar system involving railroad haul of dry materials. These plans were fairly complete, even to power requirements and size and number of pumps needed and size of pipe required. All suggested plants were based on an input of 5,200 cu.yd. of material daily to the dam.

However, after careful study, the successful bidder ignored all of the district's suggested plans of construction plant and worked out one of its own that is proving highly efficient with an output of 8,000 to 10,000 cu.yd. per day, or 48,000 to 50,000 cu.yd. per week. Briefly, the method in use involves truck haul of dry materials, mechanical feeding of materials to a sluice box over a rotary grizzly, and dredge pump delivery of the mixed material to the dam through two lines of discharge pipe. The mechanical feed eliminates the usual monitor jet mixing in the hog box, and the delivery of mixed materials by dredge pump permits a single-plant installation, eliminating the moves that would have been necessary if gravity delivery had been used.

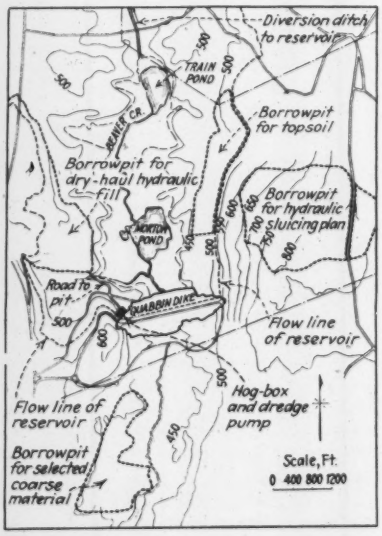


FIG. 1—QUABBIN DIKE and its borrow pits. The dam is being built by dry haul to hog box and dredge pump delivery of material to place. One of four available borrow pits was suitable for hydraulic sluicing and pipeline transportation of material, a suggested method discarded in favor of truck haul.

The specifications require 2,100,000 cu.yd. embankment to be placed by the full hydraulic method, the deposition of silt in a central pool forming an impervious core, held in place by shoulders of coarse, pervious material. The dike, 135 ft. high, 800 ft. wide at the base and 2,140 ft. long at the crest, will close a saddle between two hills at the rim of the proposed Quabbin reservoir. The silt core has a minimum width of 100 ft. at the base, 14 ft. at the top. On the downstream face the embankment slopes 1 on 2½ for the lower portion; 1 on 2 for the upper, the slope breaking at a 10-ft. berm. A 60-ft. berm breaks into the lower slope. The upstream face rises from the base on a slope of 1 on 3, but steepens to 1 on 2 toward the top. The entire upper face will be covered with riprap on a crushed stone base. Fig. 2 shows the maximum cross section.

The site of Quabbin Dike is a valley filled with glacial till. To obtain a satisfactory cut-off in the valley floor 31 concrete pneumatic caissons were sunk end to end across the valley as a tight core wall. This work was done under previous contracts (*ENR*, Aug. 24, 1933, p. 215). Earth cofferdams and toes of coarse material above and below the dike were built from early stripping operations and from core wall excavation.

The dike is just below and outside of the reservoir watershed area, on a small brook that heads up only ¼ mile up-

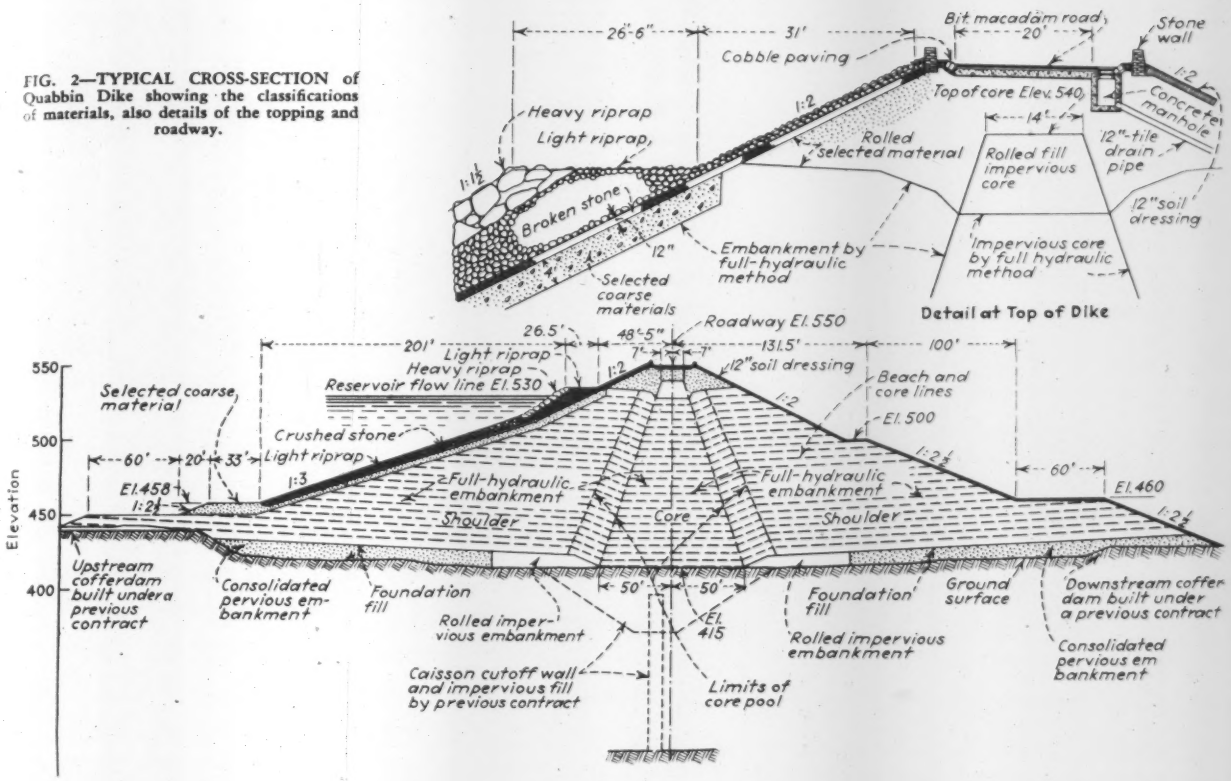


FIG. 2—TYPICAL CROSS-SECTION of Quabbin Dike showing the classifications of materials, also details of the topping and roadway.

stream. A natural pond existed just above the site, and diversion of the creek during core wall construction was through a pipeline. At the start of the present contract the pipeline was closed, creating a small storage behind the upper cofferdam.

Various plans analyzed

Although none of the three plans suggested by the district were used by the contractors, each was thoroughly analyzed before being discarded in favor of the contractor's own scheme.

The first suggested plan called for hydraulic excavation and pipeline transmission from borrow pit to dike. This plan involved pumping from floating plant on the core pool to monitor jets at the borrow pit, collection of sluiced materials by means of ditches and flumes to a collection box; rejection of oversize stone by a grizzly, and a 24-in. gravity pipe line for deilvery of mixed material to the beaches. Make-up water for the pool would come from the pond above the upstream cofferdam. The borrow pit designated for the sluicing method lies upstream on the east side of the valley, about 3,500 ft. from the center of the dam, and at an elevation permitting a 4 per cent downgrade on the discharge pipe line. For placement of 5,200 cu.yd. per day, from a discharge of 6 per cent solids, the following plant was suggested: pool pumping plant—six units of two 10-in., 4,000-g.p.m. at 200-ft. head pumps in series, driven by six 500-hp. electric motors; booster pump plant near borrow pit—six units of two 10-in. 4,000-g.p.m. at 150-ft. head pumps in series, driven by six 200-hp. motors; delivery water to 3-in. monitor jets at 100-lb. pressure; pipe lines from float to booster—one 24-in. or two 18-in. lines; make-up pump at pond—two 4,000-g.p.m. pumps in series, at 175-ft. head, driven by 500-hp. motors, pumping through a 16-in. line that would also serve as a waste line for excess water in the pool. The collection box of wood or concrete might have to be moved once or more.

The second plan involved truck or tractor-wagon haul from a borrow pit upstream on the west bank about ½ mile from the dam. Dry material would be discharged through a grizzly into a hog box on the west abutment, mixed by monitor jet sluicing and discharged by gravity to the beaches. Suggested equipment included three 2½-yd. shovels at the borrow pit, eighteen 5-yd. trucks or ten 12-yd. tractor-wagon units, six units of two 10-in. 4,000-g.p.m. at 175-ft. head pumps on floats in the core pool for the hog box sluicing, with one 24-in. or two 18-in. pipe lines from floats to hog box. The pumps would be driven by six 500-hp. motors. This plan contemplated gravity discharge of the material from hog box to beach. Two hog boxes at different elevations would be required, or one box would have to be moved at least once to a higher elevation. An alternate discharge plan would be to use dredge pumps at the hog box, but this was listed as probably uneconomical. Make-up water for the pool would be supplied by two 4,000-g.p.m. at 250-ft. head pumps through a 16-in. pipe line. Discharge lines on the beach would be 24 in. for filling on one beach at a time, or 18 in. for simultaneous discharge on both beaches.

The third suggested plan was identical with the second, except railroad haul would be used for dry materials from borrow pit to hog box. Nine trains of one 18-ton locomotive and ten 4-yd. dump cars, all 36 in. gage, would be required, with at least three complete trains in reserve.

The above is only a brief review of the possible construction plans worked out by the engineers. They were presented in great detail and were accompanied by sufficient drawings, even including a design of hog box, to assist a contractor to properly equip and carry on the work. Without doubt, any one of the three suggested schemes would have worked well.

Contractors plant analysis

The contractors selection of plant and method for placing the 2,100,000 cu. yd. of hydraulic fill was influenced by plant requirements for other features of the work. Besides the hydraulic fill, the dam requires 175,000 cu.yd. of consolidated pervious foundation embank-

FIG. 3—HYDRAULIC FILLING of the dam under way. Pumped through 20-in. pipelines, a concentration of 13 to 15 per cent solids builds up the fill at the rate of 8,000 to 10,000 cu. yd. per day.

FIG. 4—HYDRAULIC FILL for Quabbin Dike is being pumped through two long pipelines on both beaches. The view at the left shows the core pool with the floating pumping plant for supplying water to the hog box in the foreground.

ment, 145,000 cu.yd. rolled impervious embankment, 100,000 cu.yd. of selected coarse material and 139,000 cu.yd. of riprap and crushed stone blanket. Obviously truck or wagon haul was the logical method of placement of these items. As none of these items would be worked simultaneously with hydraulic fill placing, except possibly blanket and riprap work, both the hydraulic and non-hydraulic material could be handled by the same truck or wagon haulage system. The truck or wagon units would have been required in addition to the pumping plant on the first, and the railroad plant on the third, suggested plan, which put these two plans into early disfavor.

For the all-hydraulic method, the investment in pumping plant and power for getting the water to the sluices would have been heavy, and the make-up pumps to keep the core pool full, overcoming the losses at the borrow pit, would have to be used almost continuously. The railroad plant would also have been a heavy investment, and maintenance of track in the borrow pit area would have been a considerable item, especially in view of the frequent moving of shovels to obtain desired materials.

The district plans for gravity discharge of material from the sluiced borrow pit or from hog boxes to the beach distribution contemplated a mixture of only 6 per cent solids, and a slope of pipe line of at least 4 per cent. Naturally this high percentage of excess water meant not only the installation of large-capacity pumping units, but a considerable power load to operate them. Furthermore, in considering gravity discharge from the hog box, the contractor was skeptical of satisfactory results from a pipe line grade of only 4 per cent.

Because of the necessity of truck or wagon-haul on other parts of the work, the first and third plans were early discarded in the contractors planning of job operations. The loading and hauling plant as finally selected includes four 1¾-yd. shovels, two gas and two electric, twelve 6-yd. tractor-wagon units equipped with sideboards to haul 8 yd., and three 6-yd. dump trucks. One shovel and a limited number of hauling units work in sand; the other three groups of shovels and their wagons work the general borrow pit, a hard-digging formation of gravel, sand and rock flour, filled with innumerable boulders of all sizes.

Once the choice was made to dry haul from borrow pit to hog box, the next consideration was mixing and discharge of materials. The usual method is to dump the dry materials into a hog box, then sluice to a collecting sump with monitor jets at high pressure, which thoroughly breaks up the material and puts it into suspension for pipe line transportation to the beaches. While usually effective, this method has the disadvantage of occasionally clogging the sump or pipe line with a mass of improperly mixed material, and, furthermore, the degree of concentration of solids in the mixture varies considerably from time to time.

Mechanical feed at hog box

To overcome these objections, the contractor devised a mechanical feed of dry materials into a sluice box at the pipe line intake. Double plate feeder mechanisms, electric powered, similar to those used in gravel plant installations, was set at the bottom of a trapezoidal receiving hopper. Their combined capacity is 500 cu.yd. per hour. The trucks and wagon dump into this hopper through a rail grid that excludes all boulders too large for the feeder to handle.

Regardless of the amount in the receiving hopper, the mechanical feeders discharge a constant stream of material at an even rate to a revolving grizzly with 2-in. bars, rotating normal to the line of feed, and spaced 6 in. apart. Stones over 8 in. in diameter are thrown by the grizzly into a chute feeding into small cars for disposal. The oversize material passing through the feeders averages 10 per cent of the total volume. These boulders are stored for future use as riprap, are carried direct

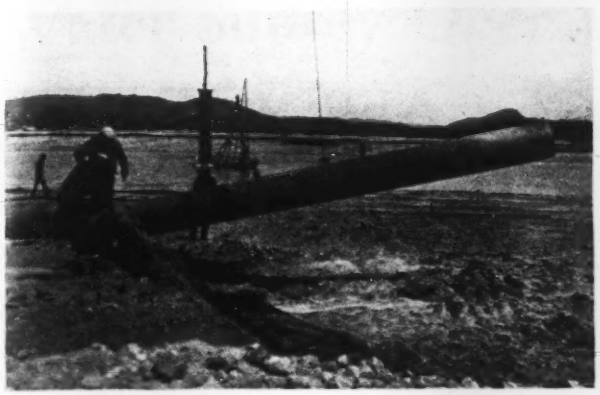


FIG. 5—ON AND OFF without interruption of flow. At the left a 20-ft. section of beach discharge pipeline is being added to the line with no trouble except a slight wetting of the two workmen. A jerk of a crane line and a swing of the boom removes a pipe length, as shown at right.

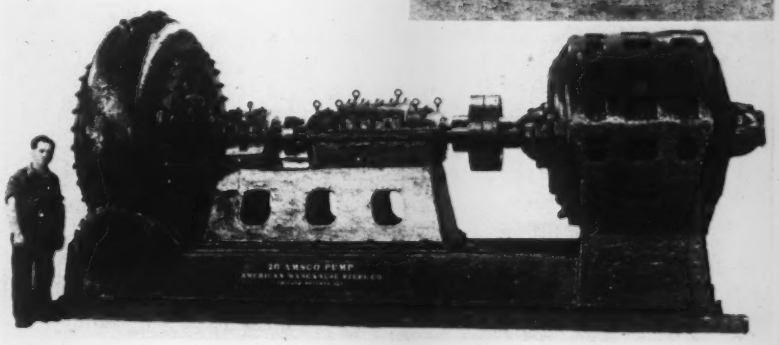


FIG. 6—THE 20-IN. DREDGE PUMP and its driving motor are a sizable piece of equipment. The inset is a three-vane impeller equipped with removable shoes, a change from the original four-vane impeller in an effort to reduce wear from abrasion.

to place on the upsteam embankment or are crushed for the stone blanket under the riprap. An industrial railroad handles the boulders and crushed rock.

Material passing through the grizzly falls into a concrete sluiceway. Water for mixing is pumped from the core pool into a storage box surrounding the sluiceway. A 2-ft. head on the sluice box creates a velocity of water through it that insures thorough mixing of water and materials. A sliding gate between water storage and sluice box regulates the flow, usually 12,000 g.p.m.

After working out the mixing detail, the next step in planning the operation was to provide discharge of materials to the beaches. Distrustful of gravity discharge and not wanting to move the hog box set-up, the contractor gave consideration to a dredge pump discharge. Calculations showed that a 20-in. pump would be required, discharging through 20-in. lines to both beaches. An important consideration in the decision to use a dredge pump was the fact that the concentration of the pumped mixture could be increased to 13 or 15 per cent solids, resulting in a considerable saving in pumping from core pool to hog box.

A special dredge pump was designed for this job by Perry Nagle, of the American Manganese Steel Co., working with C. B. Molineaux, chief construction engineer for the contractor. Operating conditions which the pump had to meet were a discharge of 500 cu.yd. of solids per hour against a static head of 60 ft. through a 20-in. pipe line 2,500 ft. long. The maximum total dynamic head involved, including entrance losses, the vertical lift and pipe line friction losses, is 185 ft. However, at the start and during the early stages of filling, the discharge pipe sloped downward from the pump, making the dynamic head zero or negative. This wide variation in head complicated the design of a suitable impeller to meet all conditions.

A funnel-mouth four-blade impeller 72 in. in diameter was finally selected as best suited to the varying pumping requirements. The impeller is screwed to a two-piece shaft, which is carried by a thrust bearing and a steady bearing. Both bearings are oil lubricated by forced feed.

Impeller redesigned

The pump is powered by 1,000-hp. direct-connected slip-ring electric motor with a drum-type speed regulator. Full load speed of the motor is 392 r.p.m., though a reduction of 30 per cent in speed is possible through the regulator. The pump weighs 60,560 lb.; the motor 19,550 lb.

Material going through the pump is very abrasive, and experience has shown the four-blade one-piece impeller stands up for about 200,000 cu.yd. before wearing down to the point of inefficient operation. At the suggestion of the contractor, a three-blade impeller equipped with removable shoes has just been installed (Fig. 6). It is hoped that by occasional changing of shoes the life of the impeller will be greatly increased.

Control of operations of the mechanical feeder and the dredge pump are from a central control station. A gage in the operating house indicates the hydraulic pressure in the pump discharge line. The operator varies the pump speed to keep the pressure more nearly constant. A sudden rise of the gage indicates clogging in the line, and in such instances the operator shuts down the feeders until the line clears. Control of the rotating grizzly is from a switch at the unit, so the crew handling the oversize material may stop the machine instantly in case of a jam of stones. The grizzly is further protected by a circuit breaker susceptible to slight overload on the motor drive.

Floating on the core pool is a barge containing two pumps for supplying water to the hog box (Fig. 4). The units are one 14-in. pump, 8,000-g.p.m. at 120-ft. head, direct connected to a 300-hp. electric motor, and one 10-in. pump, 2,000-g.p.m. at 120-ft. head, driven by a 75-hp. motor. These pumps discharge through a 24-in. line carried on floats to the west abutment, over

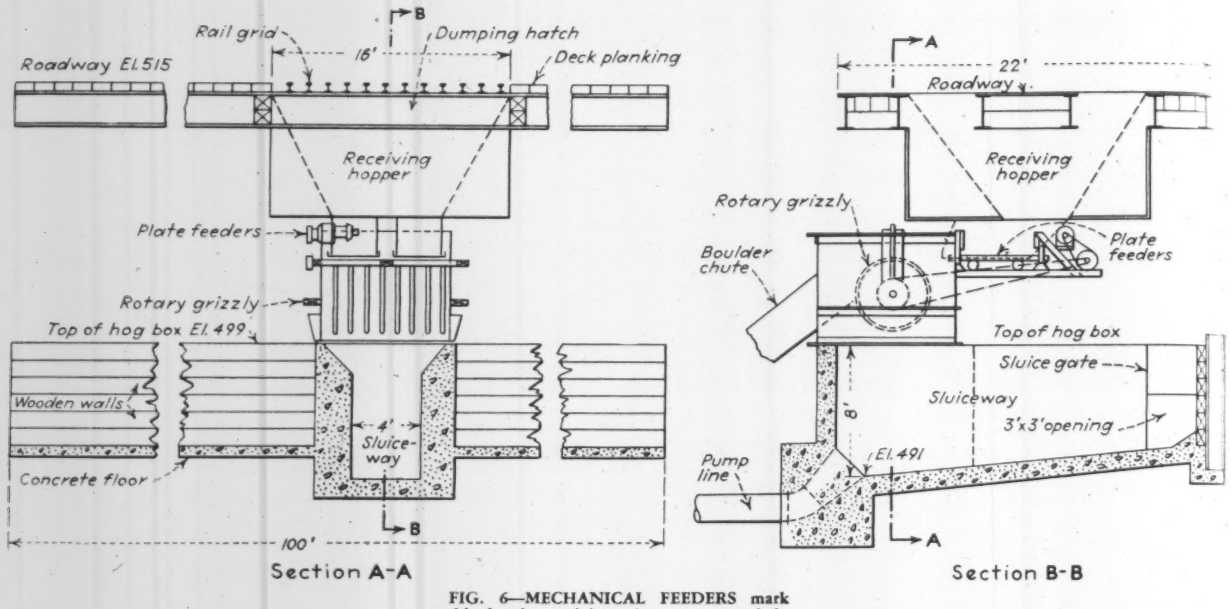


FIG. 6—MECHANICAL FEEDERS mark this hog-box mixing plant as unusual in hydraulic fill plant.

which it rises to the sluice box. To prevent pumpage of silt from the core pool, the intakes of these two pumps are inside a submerged steel tank, the top of which is kept just below water surface.

Two make-up pumps having a combined capacity of 4,000 g.p.m. at the upstream pond supply water to the core pool as needed. These pumps operate about one-third of the time.

Hydraulic filling

Under the previous core wall contract, the foundation area adjacent to the core wall was, in general, backfilled to top of wall. This backfilling served as the bottom core pool at the start of hydraulic fill operations. In preparation for hydraulic filling, the present contractor stripped the remainder of the dam site of top soil and built rolled fill embankments on both sides of the core pool area as a base for the main fill.

The discharge pipe line is a single, tight-connected 20-in. steel pipe from the dredge pump to the west abutment, where it splits into two 20-in. lines, one along each beach. Discharge on the beaches is from one line at a time, the two sides of the dam being built up in alternate layers about 6 in. thick. Gate valves at the junction of the beach lines direct the flow into the line desired.

The discharge pipe lines are of 20-ft. lengths of welded steel pipe with friction slip-joint connection. At the start of filling, trestles carried the pipe lines, but after the beaches became well defined it was found possible to carry the lines on wood blocking under every joint (Fig. 3).

Filling is progressive from one end of the core pool to the other along one beach at a time. The pipe lines are built up, or dismantled, by adding or removing one 20-ft. length at a time, depending on the direction of filling. Pumped material discharges from the open end of the pipe line directly on the beach, without use of tables, until the beach is built up at that point sufficient to force the shore line of the pool to its inside limit of width, then the discharge is moved to the next pipe line.

A downward slope of ½ of 1 per cent is maintained in the beach pipeline from the pumping end.

Baffle boards direct and control the flow across the beach from point of discharge to pool. A dragline follows the discharging operations, and is used to handle the pipe section in making up or dismantling the line, and in building up a levee on the outside of the beach.

Pipe sections are added or removed without interrupting the discharge. When a section is to be added, a cable from the dragline holds it in position while workmen shove it into place. The cable holds the pipe until blocking is built up for its support. A hand winch clamped to the pipe line several lengths away is utilized for the horizontal pull necessary to tighten the slip joint. When a pipe section is to be removed from the line, the cable is fastened near the free end. A few jerks loosen the joint, and a swing of the boom pulls the pipe section loose (Fig. 5).

The material at hand is proving ideal for hydraulic filling. The outer shells of the dam are of coarse gravel, the shoulders a hard-packing sand varying from coarse at the outside to fine toward the pool, and the core is fine silt with some clay that is consolidating very well. In case one type of material runs too strong or too light, the shovels are shifted in the borrow pit to correct the trouble.

Work is carried on in three 8-hr. shifts per day, six days a week. Placement of hydraulic fill runs from 48,000 to 50,000 cu.yd. per week.

Samples of the silt core are taken at regular intervals for laboratory analysis. Rate of consolidation is measured by ball weight soundings and by bar penetrations. One of the caissons for the cut-off wall had been used as a pump well for lowering the ground water. An opening from a well in this caisson is being extended upward through the core by building up a steel pipe shaft. Inspection of the core can be made through this shaft if desired.

After the hydraulic fill has been carried as high as practicable, the dam will be topped out by a rolled fill, with impervious material placed over the core. A roadway will extend along the crest between stone masonry guard walls. A drainage system of 12- to 24-in. tile will be placed in the downstream face.

Direction

The dike is being built as part of the Quabbin reservoir development of the Metropolitan District Water Supply Commission, a state agency supplying water to Boston and surrounding towns. Frank E. Winsor is chief engineer of the commission, Karl R. Kennison is assistant chief engineer. LeRoy Hammond is division engineer in charge of construction in the Quabbin Reservoir, and Preston Putnam is resident engineer at the dike.

Contract for the dike was let December 5, 1934, to the Arthur A. Johnson Corp., of Long Island City, N. Y., for $1,446,655. Hydraulic fill started September 1, 1935, and after 500,000 cu.yd. had been placed, was shut down for the winter on December 3. Pumping was resumed again March 30 of this year, and the hydraulic fill work will be completed this season. Richard A. Johnson, vice-president, and C. B. Molineaux, chief construction engineer, are in charge for the contractor.

Water Supply Operation Discussions —A.W.W.A.'s Los Angeles Convention

THE PRESENTATION of 55 papers and 14 reports did not prevent effective consideration of vital topics by the 900 delegates at the Los Angeles convention of the Water Works Association on June 8-12. The four-day session was comprehensive in its coverage of every phase of waterworks practice including supply works, distribution systems, purification technique and plant management. New and better methods of water treatment and a trend toward labor-saving by wider use of automatic control for pumping plants were among the topics on which much valuable information was added to technical literature. Considerable interest was displayed in discussions on means for maintaining higher flow coefficients and the methods found useful in obtaining more effective protective coatings for pipes.

Increasing confidence of manufacturers in business conditions was manifested by a collection of exhibits that surpass the exhibitions at many previous conventions; the healthy condition of the Association was indicated by the report that the membership gain during the past year exceeded that of any year since 1918 and the limit of proper Association membership by no means has been reached. Technical sessions, of which as many as three were held simultaneously, were interlarded with a generous measure of sightseeing and entertainment. No technical sessions were held Wednesday afternoon, thus giving a refreshing break midway in a long and heavily loaded program. The final day, Friday, was devoted to an all-day automobile trip to points of interest on the extensive Los Angeles distribution system.

President Frank A. Barbour, in his annual address at the opening session, stressed the importance of the section and section activities. These he rated as the most potential asset of the Association; through the sections men participate in service activities. The future of the Association depends upon its development as a strong, active, efficient agency for the men engaged in the operating field of municipal water supply, he said. The Association should expand its activities to include improvement of the human and the public relations of the water works operator, it should cooperate in the improvement of municipal administrative practice; find ways of educating the public to the importance of raising the standards of service and keeping in office men capable of maintaining higher standards. These policies can be formulated at Association headquarters, but the real work of putting them into practice and influencing public opinion must be done through the sections. The formation of sections in all states as rapidly as feasible should be encouraged.

A weighty technical program presented to 900 delegates included in its subjects higher flow coefficients, better protective coatings, water treatment and automatic pump control methods

In inducting into office the new president, W. W. Hurlbut, Los Angeles, retiring president Barbour said that in Mr. Hurlbut's organization are 86 members of the Association, more than in any other water department in the United States, a record for which much credit goes to the new president personally. New division chairman were announced as follows: water purification, C. J. Lauter, Washington, D. C.; plant management, W. B. Weir, St. Louis; finance and accounting, Hal F. Smith, Detroit.

The Franklin Henshaw cup went to the Montana Section for a 92 per cent attendance at meetings; the Nicholas Hill, Jr. cup for highest percentage of membership gain went to the Rocky Mountain Section. Buffalo, New York, was announced as the next convention city.

Committee reports

Louis R. Howson, Chicago, reported that the committee on steel stand pipes and elevated tanks has completed a specification dealing with riveted construction exclusively and that a new committee is being organized to deal with welded practice.

Thomas H. Wiggin, New York, reporting for the committee on specifications for cast iron pipe, announced a plan for issuing a manual which will enable users to determine the thickness of cast iron pipe suitable for conditions they have to meet.

Abel Wolman, Baltimore, reported that the national water policy committee has been active at Washington in presenting to Congressional committees information clarifying the situation on proposed legislation affecting the field of water supply. Since January eight or ten bills have been introduced dealing with stream regulation. One, based on the theory that local and state control have failed to prevent stream pollution, proposed putting this under federal control. The answer to this is that lack of funds, not rules, is the reason why more has not been accomplished; more laws *per se* will not help.

Prof. Lewis V. Carpenter, New York University reported that all but nine states now have short schools or similar organizations for instructing waterworks operators. His committee is following a definite program for fostering and extending this work. Licensing of waterworks employees, also assigned to his committee, tends to reduce the frequent changes in personnel which make for risk and inefficiency in operation.

Water supply in California

THE PROCESS of supplying water to a rapidly increasing population in an area that has expanded steadily was described by H. A. Van Norman, Los Angeles. Los Angeles now includes 450 sq.mi., has elevations ranging from sea level to El. 1,720, and uses some 3,800 miles of distribution mains. Despite these unusual requirements and a per capita consumption of 130 gal. per day, the highest rate charged Los Angeles consumers is 13c. per 100 cu.ft., less than the average rate for 100 of the largest cities in the United States. The city's investment in the water system in its entirety is about $100 per capita.

N. A. Eckart, San Francisco, summarized development of the Hetch Hetchy system, which recently began delivery of water to San Francisco; the hardness of 180 p.p.m. to which the city has become accustomed now is being reduced to 80 p.p.m. An ultimate population of 5 million will be provided for by the present sources, which readily can be made to deliver 5 m.g.d. Of this total 4 m.g.d. is available from the Hetch Hetchy project and 1 m.g.d. from the old Spring Valley sources.

H. D. Fowler, superintendent of the Seattle water department, spoke of an advertising campaign to promote the use of water among large consumers. There is strong competition in this line in the Northwest, however; Everett, for example, offers pulp mills water rates that begin with $13 per m.g. and decrease to $8 per m.g. after a 5-year period.

J. B. Lippincott, Los Angeles, said that the assessed valuation of the entire San Fernando Valley before completion of the Owens Valley aqueduct was less than $10,000,000; within 25 years, with abundant water available,

the assessed valuation of the same area exclusive of cities was $106,000,000, and the real value exceeded $200,000,000. This value increase in only a small part of the area served by the new supply equaled eight times the total cost of the entire project.

An area of 50,000 acres in San Fernando Valley, he said, now is served by water on a two-meter basis, one for irrigation and one for domestic use. The rates are, respectively, 1½ and 13 cents per hundred cu.ft.; both supplies are the same quality served from the same main. Assuming that the aqueduct would be built for the domestic supply alone, this irrigation rate pays its share of interest, depreciation and operation costs. The average irrigation use in this valley is 1.42 acre-ft. per acre per year, of which the city recovers 27½ per cent by pumping from the underground storage basin beneath the irrigated area.

Within Mr. Lippincott's memory the area now occupied by Hollywood was a dry wheat farm; the opportunity for development came with abundant water. The policy of Los Angeles has been to develop water in excess of immediate domestic needs and to use it for irrigation within city limits until urban development displaced agriculture.

Answering a query as to the need for the Mono water project with the Colorado River supply so near, Mr. Lippincott said the Mono supply will provide sustained flow in the Owens Valley aqueduct even in periods of low runoff, thus maintaining the source of water power in the aqueduct power plants. These plants, he said, have been netting the city $4,000,000 per year over and above all operating expenses and fixed charges.

W. W. Brush, New York, describing underground water problems on Long Island, New York, stressed the advantage of having an Association committee study the broad subject of groundwater storages with a view to recommendations on ways and means of replenishing depleted supplies in underground basins, together with a basis for distributing the costs of such work. Thomas H. Wiggin, New York, said that between 1908 and 1932, 120 billion gallons had been pumped from that portion of the Long Island underground basin within the boundaries of the city of New York, and that the problem now is how to replace this withdrawal.

In discussion of the paper by Abel Wolman, Baltimore on federal conservation of water resources (which will be abstracted in a later issue), C. G. Gillespie, California state sanitary engineer, pointed out that in recent depression years California has had no sanitary projects other than those built with some sort of federal subsidy. As a result there now is a tendency to await some such subsidy before undertaking these projects. Therefore, unless financial aid from federal sources is to be very extensive, the long-time progress actually may be slower than under local initiative.

Air conditioning facts

A PAPER by L. L. Lewis and L. H. Polderman, Carrier Engineering Corp., on what modern air conditioning means to the water utility, pointed out that five changes in air are essential to complete air conditioning: adequate control of temperature and humidity, adequate provision for ventilation and circulation and also for cleansing (which includes removal of dirt and odors.) Equipment to perform these functions naturally divides itself into two classes (1) that which provides for motion and treatment of air and (2) that which refrigerates.

The simplest way to remove effluent heat is to transmit it to water which then is wasted into the sewer. Other means are available, of course, and the extent to which the various means will be feasible is influenced, if not determined, by the relative cost of power and water and the temperature of the latter.

With power costs varying from 1 to 3c. per k.w.h., water costs varying from 45c. to $2.85 per M. cu.ft. and water temperatures all the way from 56 to 85 deg. F., the wide range of factors entering the comparison becomes apparent. The daily demand for water used in air conditioning in 1936 will be much greater, perhaps double, than for 1935 and the rate probably will continue to show an increase for several consecutive years.

If the 1935 practice is used as a basis and if air conditioning continues at the estimated rate through 1938 the average daily use per capita will have reached 4 gal., with a peak demand of 30 gal. However, equipment for conserving water could change these figures to 1.8 and 13 gal. per capita, respectively.

Discussion from the floor cited New York practice, which allows theaters to use water from wells for cooling air but requires the water (1) to be used only in closed circuits and (2) to be returned to the groundwater supply (also via wells). Well water is taken from the ground at 55 to 59 deg. F. and is returned some ten degrees higher. There was an unanswered question as to how close supply and return wells could be located under these conditions without causing temperature interference.

Better water quality

CHAIRMAN M. M. Braidech, of subcommittee on specifications and tests for activated carbon, reviewed the work of his committee since its formation in 1932. Conclusions so far are that the phenol test is the only reliable test and either the Fox and Gage or the Bullis-Gibbs method is good. The method of testing should be standardized and carefully followed and standard samples of carbon of known value should be available.

R. L. Derby, Los Angeles, spoke on methods of testing and significance of boron in water supplies. Three methods of testing were discussed of which the Wilcox electrometric method is most reliable and rapid. The significance of boron is that many plants are very sensitive to it especially the lemon. Boron in excess of 0.5 p.p.m. in water causes partial defoliation of lemon trees, while dates require at least 5 p.p.m. for satisfactory growth. Boron may enter the water from hot springs or, in volcanic regions, from furmaroles and geysers. Boron cannot be removed satisfactorily from water by chemical treatment. Los Angeles eliminates it from the aqueduct supply by wasting water during periods of high boron content caused by melting snows from a region of hot lakes.

Methods of testing for fluorides and their significance in water supplies was discussed by J. M. Sanchis, Los Angeles. The colorimetric is the most rapid and the distillation method the most accurate. The effect of various ions on the colorimetric test was discussed. The distillation method is preferable to making up a synthetic water to eliminate the action of interfering ions on the colorimetric test. The effect of fluorine on the human system is improper calcification of the teeth while forming, with resulting discoloration and poor quality. Soluble fluorine compounds are more harmful than insoluble, and organically combined fluorine is less harmful than the insoluble compounds. In general, 1 p.p.m. or less is not considered harmful.

G. E. Arnold, San Francisco, spoke on plankton and insect larvae control in California waters. A review of methods of treating algae by bluestone was given and the methods of Sopp at Pasadena, Goudey at Los Angeles and Arnold at San Francisco were compared. Sopp uses bluestone solution, Goudey a dry spray of sugar-size particles, Arnold a water spray. A review of various insect larvae to be found and treatment to control them was given. Blood worms, gnats, caddis flies, etc. are best eliminated by draining stagnant water or screening reservoirs. In discussion F. E. Hale, New York, and C. R. Cox, Albany, reported that continuous feed of bluestone of 1 lb. per m.g. gave excellent control in reservoirs. N. J. Howard, Toronto, found that joint use of chlorine, ammonia and bluestone (cupric chloramine) has given good results in England and Germany. Pretreatment with bluestone may hurt the schmutzdeke of slow sand filters.

The use of manganese ore in iron and manganese removal was discussed by

W. G. Kirchoffer who described experience with beds of pyrolusite (manganese dioxide) for the removal of manganese. Pure pyrolusite is a good catalyst but is too heavy for use as a filter medium, as proper backwashing cannot take place. The use of zeolites or manganese-coated sand has been found to give better results.

Prof. W. F. Langlier, University of California, reviewed the analytical control of anti-corrosion water treatment. The paper stressed the fact that iron is not a stable metal but needs protection; any water will attack iron if it is clean. Protection therefore is needed and may be in the form of calcium carbonate. Formulas are worked out for the proper relation between calcium, carbon dioxide, alkalinity and *p*H concentration of water to make the water noncorrosive. This means that at the proper *p*H, calcium and alkalinity concentrations, a thin protective coating of calcium will be deposited but an excess, sufficient to clog the pipes, will not be so deposited. By calculation from the formula given, using the amount of calcium and alkalinity found by analysis and constants from tables, the *p*H of the saturation point of the water to calcium carbonate (called *p*H*s*) may be found for a given water at a given temperature. The difference (*p*H actual — *p*H*s*) is called the saturation index, and its algebraic value will determine whether a given water at a given point in the distribution system will deposit or corrode a protective carbonate film in the pipe interior. If the difference is negative the water will corrode and if positive deposition will take place. Both value of *p*H and *p*H*s* vary with the temperature so that a water may be corrosive at one temperature and not at another. For best control the index should be zero where the trouble is greatest i.e. in hot water. A saturation index of minus 0.5 in cold water will give an index of zero in hot water.

In the symposium on filtration C. M. Hoskinson, Sacramento, stressed the value of a fast initial mix followed by lessened velocity. K. W. Brown, Stockton, reported the need of proper conditioning of water with a proper mixing and coagulant dose. H. N. Jenks, Berkeley, spoke on proper design of filters to take their share of the load. C. J. Lauter, Washington, D. C., mentioned the value of proper pretreatment. At Washington, doubling the sedimentation basin capacity reduced the coagulant use one third. J. D. DeCosta, Oakland, gave a detailed description of the Orinda Filter Plant for the East Bay Municipal Utility District, where no pretreatment is used. This plant is of 28 m.g.d. present and 105 m.g.d. ultimate capacity.

UPPER and lower Hollywood reservoirs of the Los Angeles system

Features of this plant are: no coagulant used, filter rates 1½ times normal, automatic control of inlet water, plant design permits expansion and future sedimentation if necessary, and baffles in the gravel bed to prevent lateral displacement of the gravel during washing. Lime is applied in the amount of ¼ grain per gallon for *p*H control. The plant has handled up to 43 m.g.d. Maximum turbidity of raw water is 7 p.p.m., average 3 p.p.m., final turbidity 0.3 to 1 p.p.m.

Symposium on tuberculation

IN A SYMPOSIUM on the cost of tuberculation in water pipes, Edgar K. Wilson, Pitometer Co., New York, reported the results of an extensive survey including about 900 tests in various cities of the East and Middlewest to determine coefficients. Investigation showed some pipes to have coefficients as high as 159 while others fell far below the Williams-Hazen curves for pipes of varying ages. Conclusions were: (1) confirmation of findings of the N.E.W.A.A. committee on coefficients (*ENR*—Oct 24, 1936 p. 573), (2) many pipes manufactured in the 1880's were given a treatment that preserved their carrying capacity better than did later treatments, and (3) obstructions, particularly air pockets, cause more capacity loss than is generally realized. Tests should be made on this account and high points in mains should be vented.

Frank A. Barbour, Boston, in a paper on the economic significance of improved pipe linings, stressed the necessity for the further investigation of pipe-line friction losses which is to be carried on by the newly appointed joint committee of the N.E.W.W.A. and the A.W.W.A. Serious discrepancy appears, he said, between the friction loss commonly expected in tar-dipped cast iron pipe and that which has been found to exist. Instead of the 30 per cent capacity loss in 15 or 20 years after installation (which is assumed when the value of 100 is used in applying the Williams and Hazen tables for a 15 or 20-year service period) substantially greater losses (ranging up to 60 per cent) have been observed. For example, 473 tests for friction losses in pipes averaging 20½ in. in diameter showed an average coefficient *C* at the age of 20 years of 73, a capacity loss of 44 per cent; at the age of 30 years the average for *C* was 63 and the capacity loss of 52 per cent.

The investment value of cast-iron pipe is measured by its hydraulic usefulness, not by its life as a metallic structure; since such poor hydraulic properties have been shown by tar-dipped pipe other kinds of lining naturally are being sought. Excellent results are shown by cement and bitumastic linings; a sustained coefficient of 100 for pipe of 12-in. diameter and smaller and of 120 for larger sizes now is indicated.

Experience in Los Angeles in improving protective treatment for steel pipe lines, described by Harry Hayes and L. E. Goit, has included many new and useful developments in methods and equipment.

Residual chlorination control

THE RESULTS of several years' research, in connection with manufacturers, in the development of an automatic residual controlled chlorinator, were described by R. F. Goudey, Los Angeles. The old system requiring manual adjustment to adapt the dosage to varying chlorine demand was not suited to reservoirs subject to sudden and wide fluctuations in demand. The improvements adjust the dosage automatically to suit chlorine demand. Elec-

trical mechanism which does this uses a photoglow tube to compare fixed standards with samples of water from the conduit (taken continuously 300 ft. below the point of chlorine application).

The electrical device "observes" the sample at three-minute intervals and varies the chlorine dosage after each observation to maintain a predetermined residual despite wide variations in chlorine demand. This new form of control is in addition to and in no wise interferes with the usual automatic regulation which varies the quantity of chlorine in proportion to the quantity of flow in the conduit.

Mr. Goudey pointed out that the variations in demand are much wider than sometimes is realized; rain and wind have changed the chlorine demand in Los Angeles reservoirs from 1.7 to 4.6 lb. of chlorine per m.g. However, even under these conditions the new automatic regulations prevent over and under dosage, gives positive disinfection, eliminates complaints of chlorinous odors and tastes and makes a decided cost saving by the more efficient use of chlorine. On this last point he reported an average saving at one Los Angeles reservoir of 1 lb. of chlorine per m.g. for a 200 sec.-ft. flow, which is the equivalent of $125 per month.

Iron removal without aeration was the subject of a paper by Frank E. Hale, director of Mt. Prospect Laboratories, New York City, wherein was described the precipitation of ferrous carbonate in a closed system with single pumpage from a soft well water in Flushing containing 3 to 5 p.p.m. of iron. A pressure filter was inserted in the line between the wells and the main. Lime was added and with no dissolved ogygen in the influent or effluent the water came through noncorrosive.

M. C. Smith, engineer bureau of water and electricity, Richmond, Va., outlined the results of many experiments with various chemicals and devices to insure better preparation of the variable James River water prior to filtration. Chlorinated copperas and alum finally proved to be the most economical. The coagulant reduction amounts to 67 per cent. Prechlorination has been effective in stabilizing the water through the plant, reducing the inhibitive action of paper mill and other trade wastes without much increase in the total amount of chlorine required. The minimum used was 10 lb. per m.g. and the average 16.3 lb. On descending turbidity content following storms, alum action had always been unreliable. Chlorinated copperas has materially assisted coagulation at such times. For further chemical control 10 to 20 lb. of lime have been added at times to reduce the chlorinated copperas. At Richmond Mr. Smith was careful to specify that his observations pertained to local conditions only, water at 4.6 deg. C. requires three times as much alum for effective coagulation as at 13 deg., which is about the optimum point. Chlorinated copperas is not particularly affected by the cold, in fact it does not work so well as the temperature rises above 13 deg.

Plant management and operation

AUTOMATIC control equipment, which has come into almost exclusive use at pumping plants with the advent of modern power units, was described by H. A. Harris, Jr., operating engineer, California Water Service Co. Many California water systems made up of small pumping units at numerous wells require automatic control for economical operation. Three general types of automatic control used separately or in combination are (1) float switch, (2) pressure or hydrostatic control and (3) electric time clock. Where several pump units work on the same system, controls are set so the most efficient units come on first and go off last. In a group of three pumps of different capacities the on and off combinations can be so set that the automatic control gives five different rates of pumping, each with certain units operating at full load.

The extent of automatic control on the systems operated by this company was shown by the statement that 104 out of 140 plants are under automatic control and only 36 are manually controlled. Of the latter 20 are used only as standbys. A full shift of operators is kept on duty at only eight plants, of which three are filter plants which require an attendant. These 140 plants include a total of 267 pumping units located in 21 separate water systems with a combined annual production of 14.2 billion gal. The total annual expense for labor is $62,000 or 4.35 per m.g. and $440 for each pumping station. The total maintenance cost on pumping equipment including all automatic controls is $7,500 annually or $28 per pumping unit. This annual maintenance figure is about three quarters of one per cent of the capital invested in electric power pumping equipment.

A paper by E. W. Breitkreutz, Los Angeles, stressed the importance of keeping records strictly up to date on all pipes, connections and valves of a water distribution system. Los Angeles maintains three kinds of water system maps intended to meet the need for speedy reference: (1) All key maintenance men have "gate books" of 11x 11-in. sheets for field use containing full information on pipes and valves of the distribution system. Scales are 300 and 600 ft. to the inch. (2) A motor-operated roll map 18 ft. wide and 12 ft. high is kept on the main office wall. This map, on a scale of 600 ft. to the inch, includes all pipe lines, marked as to kind and diameter, uses five colors to designate different sources and symbols to indicate hydrants, valves etc. (3) District or altas blue-line prints, usually on a scale of 100 ft. to the inch and each covering an area of about 2,000 x 3,000 ft. are kept in each field office for reference.

Three papers reviewing recent outstanding developments in waterworks practice covered (1) dams, pipe lines and pumping, by Prof. S. B. Morris, Stanford University; (2) water treatment, by Linn H. Enslow, Editor of *Water Works and Sewerage*, and (3) distribution service, by W. W. Brush, Editor, *Water Works Engineering*.

Prof. Morris stated that the federal project program has advanced engineering knowledge, from which the profession generally will benefit greatly. Mr. Enslow noted better corrosion control, increased activity in softening (although the West Coast seems to be laggard in this respect), renewed interest in aeration (mention made of a long pipe line in Freeport, Tex., where vacuum deaeration and sodium sulphite reduced corrosive action), the awakening of the public to the value of a safe water brought by the floods, and finally the inclusion in the new Milwaukee and Denver filter plants of surface wash.

Mr. Brush described the 1000-m.g.d. 17-ft. tunnel under New York City 500 ft. below the sea level, giving a second route into the heart of the distribution system. New equipment noted includes tight butterfly valves, methods of cleaning and the coating of mains with cement and asphalt, geophysical apparatus to locate lost pipe, a microphone to detect leaks by sound, a lock for meter bar covers, and a more accurate meter tester with automatic shut-off operated by an electric eye.

Kinks, gadgets and ideas as seen and heard in the field by Fred E. Stuart included the following ingenious operator's helps: A spray gun to locate chlorine leaks; a clock-face meter dial; odor-free water prepared from spring water; corrosion tests in mason jars with nails left over night; signs and names to help public relations; hourly samples of coagulated water in mason jars kept in series for 24 hours; removal of water from mains by compressed air; use of a radiophone system to an inaccessible pumping station; carriage of a string through a rough pipe line by a sponge; open troughs for carrying chemicals, dollies with old Ford wheels for chlorine cylinders; dry ice for recarbonization; and cleaning filter sand with fire hose nozzle under 70 lb. pressure; mixing 2 per cent soda ash solution into filters for cleaning with a portable flash mixer.

Electrolysis in water pipes

PROGRESS made in organizing studies of electrolysis in water mains was outlined by M. Warren Cowles, New York. When the A.W.W.A. in 1920 gave permission to attach ground wires to water pipes it was intended

that these connections should not carry current except in emergencies. In recent years, however, very considerable flows of current have been found, partly direct current from trolley lines, partly alternating current and partly galvanic action, altogether a formidable condition. The permission to connect ground wires was revoked last year, but the objection to such connection has been withdrawn and a cooperative plan for studying the subject now is under way.

In recent months there has been formed the American Research Committee on Electrical Grounding, sponsored by the A.W.W.A. and the Edison Institute jointly and including by invitation representatives from many other interested agencies such as telegraph, gas and electric railway companies, the Bureau of Standards, fire underwriters, plumbers etc. This group has made real advance in reaching a common understanding of the fundamental problems and thus bringing the various interests into a friendly and cordial relationship which has not always obtained heretofore. A further advance was made in the agreement to work out problems fully within the joint committee; that is, where all cannot concur in conclusions the matter will be held over for further discussion—there will be no minority reports.

Discussion brought out the fact that the Los Angeles water department maintains a corrosion research laboratory under the direction of an electrolysis engineer, Robert R. Ashline. Mr. Ashline said 10 to 15 per cent of the return load of certain electric railway lines passes through the Los Angeles water pipes; currents as high as 300 or 400 amperes flow in some of the larger mains. The heaviest flows are in the vicinity of substations, which are plotted in the danger zone for steel pipe) on an electrolysis map. The custom is to make advance electrolysis surveys of the route when new pipe lines are laid and when it is impossible to avoid zones in which large current flows will occur, to provide electrical drainage to the nearest substation.

Galvanic action may be prevented, Mr. Cowles said, or it may be increased by stray currents. Alternating current, originally thought to be responsible for only a very small percentage of electrolytic effect on pipes, now is known to be entitled to a higher rating; in some cases it may cause as much as 98 per cent of the damage done by direct current.

Finance and management

A PAPER on collecting water accounts by Samuel W. Zerman, Weehawken, N. J., brought out experiences of the Hackensack Water Co. in greatly reducing consumers' relation problems by use of the attorney system. Under this plan a politely worded personal letter from the attorney is sent to the delinquent consumers in place of the customary shut-off form letter sent out by the department. So effective is this system that eleven attorney letters per day take the place of 400 of the old form letters per day.

A paper on customer accounting practice by Hal F. Smith, Detroit, summarized answers to questions received from 194 public utilities which has been asked regarding their present system, the system in effect prior to the one now used, and the system preferred. There are indications of a trend back to the ledger system, the author believes, although he qualified this by quoting numerous letters which, while expressing only partial satisfaction with the present system, disclaimed a desire to return to the ledger sheet.

E. G. Plowman, formerly executive assistant to the Denver Board of Water Commissioners outlined the reorganization of the Denver Water system accomplished in the past three years. This reorganization has the distinction of being undertaken purely for improvement in service and efficiency and not for political reasons. This paper will be abstracted in a later issue of *Engineering News-Record*.

In a paper on application of tabulating equipment, Frank Twohy, Los Angeles, described consumers' billing and bookkeeping, payroll and labor distribution and general accounting.

H. L. Meites, Chicago, pointed out the value of printers' ink in overcoming public opposition to water meters. James E. McCaffrey, Los Angeles, California, spoke of the need for intelligence and understanding as a prerequisite to settling the public-relations problems of utilities. Samuel Leask, Jr., Santa Cruz, in a paper on unemployment compensation, compared the plans of New York and California with other state plans and pointed out the radical differences of basic operation in effect throughout the country. Most state plans are somewhat of a test case, he said, and a national policy without individual state increases in taxes might possibly be the result.

Last year the Division of Finance and Accounting of the AWWA considered adoption of the uniform classification of accounts, but it has now decided to await the experience of New York State Public Utility Commission in the courts with reference to methods of valuation and data required for appraising properties for rate-making purposes.

Providence Society Organizes To Aid Junior Engineers

RECOGNIZING the needs of the younger men in the engineering profession, the Providence Engineering Society, in cooperation with the Engineers Council for Professional Development, has entered upon a program calculated to foster the professional development of junior engineers. To obtain lasting and worth while results, a full program of activity is being developed slowly through conferences between officers and leaders of the junior group and a special committee chosen by the members of the Providence Engineering Society.

Work along these lines began early in 1935 when the Providence Engineering Society instituted a survey of the needs and opportunities of such a program. During the fall the society was informed by the Engineers Council for Professional Development, through R. I. Rees, that Providence had been selected as one of the three locations where engineering societies were considered to be so organized that they might well undertake a program of junior engineers' development along the lines proposed by the council. Consequently a committee was appointed to aid in organizing the junior engineers and to act in an advisory capacity.

For the present, the program has been limited to engineers who are not more than five years out of college or its equivalent. Membership is not limited to college men, but is open to all young men who are definitely following engineering work. Through various sources the names of about 550 young men were obtained, which seemed to be a large number for the territory included.

These men were selected with the assistance of representatives of the three engineering schools who contribute the largest number of engineering graduates in the territory, namely, Brown University, Rhode Island State College and Massachusetts Institute of Technology. Several meetings of the advisory committee were held with this small group of juniors with the result that a tentative program has been prepared and officers for the junior group have been elected.

Questionnaires were submitted to members of the junior group to obtain ideas of the needs and desires for a program of professional development. Answers to these questions are being used as a basis for determining subjects for discussion groups and for formal instruction. Junior leaders were selected to organize groups in various fields of activity, such as management; production and marketing; machine design and technical subjects; civil engineering and construction, and industrial plant engineering.

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New Impetus

DISCUSSION in Congress of unemployment relief and recovery measures has been carried to the point of virtual exhaustion, with the outcome that the recovery idea, or the doctrine that relief and recovery should be combined in one and the same purpose, has been cast aside. Continuation of the Salvation Army methods of the WPA under social-worker philosophy and control is the evident decision. The many powerful reasons that speak against the wasteful and demoralizing system weighed less than Administration pressure. But there is definite encouragement in the fact that Congress retained its independence of action sufficiently to insist upon partial continuance of PWA operations. Through the release of the revolving fund, estimated to amount ultimately to several hundred million dollars, a very substantial amount of constructive work is made possible. Badly needed community facilities can be provided and improved, and this work can be handled in such a manner as to use the existing mechanism of the construction industry, which otherwise would in large part suffer further disintegration and add to the volume of unemployment which it has sought to reduce. The PWA proviso of the bill, if administered with vigor and not paralyzed by executive restrictions, will give a further impetus to recovery, and this in the place where unemployment is greatest and recovery is most urgently needed—in construction.

The Engineer's Forum

IN THE SERIOUS PURPOSE and active discussion that characterize many of our specialist technical conventions and that were so outstandingly noticeable at the American Water Works Association's convention one may recognize some significant trends of the times. First, there is continuous progress toward more efficient shaping of the efforts and programs of these organizations. Second, their activities show steady and rapid growth, in number and detail. Third, management is coming to share with engineering in making up the subject-matter of papers and discussions—and properly so in view of the increasing management responsibilities that devolve on the engineering staffs and the growing interdependence of management, accounting and technical problems. Quite unmistakably the strength of the societies in which specialized engineering groups come together is a response to the direct needs of the art and of its practical application to public service. It is not wholly a new phenomenon, for special engineering societies began their vigorous growth some decades ago; but the new vitality which they are displaying as the extreme low of the depression recedes farther into the past is none the less significant. It bears a challenge for the general societies that the latter can hardly ignore. The profession greatly needs its broad technical societies, but evidently it needs and will cultivate its specialist organizations first of all. With compact organization and efficient management these groups have assured promise of a flourishing future, for they constitute the engineer's most immediate and most effective forum.

Better Crown Filling

KEYING THE ARCH of a tunnel lining has long been an uncertain operation. In older brick and stone masonry practice, dry blocking and even mortar-laid packing seldom made close contact with the rock and never was watertight. More certainty became possible with the advent of concrete as lining material, but even with this plastic new material hand-tamping the narrow key space still remained an uncertain operation. Segregation and entrapped air produced voids, and pressure grouting was held to be an essential finishing process where tightness of the lining was important. More certainty of tight work came with pressure processes of placing concrete by pumping and compressed-air shooting, some of the latest methods of which have been used in lining the Colorado River aqueduct tunnels described in this issue. It is worth remark that in this California work additional assurance of eliminating voids is sought by keeping the ends of the discharge pipe buried in the concrete and thus pushing the material forcibly toward the front of the forms as well as driving it to the rear and crowding it upward. With continuous concreting this procedure has a logical claim to ensuring closer packing of the crown filling against the rock face than is common without grouting.

New Knowledge Applied

BOLDNESS IN DESIGN is not often a characteristic of American dams; except under special pressure of need, American engineers are inclined to be conservative. For this reason, in addition to its unusual size for a buttress-type dam, the Lake Pleasant Dam in Arizona received wide attention when it was being built about ten years ago. In the opinion of many engineers its design was too bold, even assuming that foundation and construction conditions were ideal, which they were not. Serious cracks developed in the buttresses before the dam was completed. As a result a board of engineers, appointed by the state to report on remedial measures, ordered the spillway cut to a level 24 ft. lower until such time as the buttresses could be reinforced. The latter work has just been carried out, as described in this issue. It is worthy of special notice as it involves a relatively new method for getting interaction between steel and concrete. Its use in Lake Pleasant Dam is unusually appropriate in view of the comment on it made by one of the engineers called in to report on the structure, who questioned the feasibility of assuring interaction between the old structure and new reinforcing steel. Since that time methods of prestressing reinforcement steel have been perfected, and such methods have been applied to the reinforcement of the diaphragms built into the buttresses.

Mandatory Dust Control

SILICOSIS and kindred lung diseases are caused solely by exposure to dust. When dust is controlled the disease cannot be contracted. On this axiom New York State steps into the lead in silicosis legislation by enacting a law making the use of approved dust-control devices mandatory wherever there is a dust hazard. The Industrial

Commissioner is charged with approval of the device to be used, and the law wisely appropriates funds for a five-year study and investigation of such devices. Rock drilling is the greatest silicosis hazard in construction, and there are already three general types of protective devices available for such work: respirators, wet drills and suction hoods. Each has its advantages and disadvantages, though the recently-developed suction-hood method of control of dust at the drill hole shows special promise. But the New York law does more than merely demand dust control—it tackles the troublesome question of compensation insurance. Under the new law silicosis is compensable, but compensation is limited to $3,000. Whether or not this proves to meet all requirements, at least it will serve to hold down shyster racketeering and keep premium rates within reason until experience has been built up upon which to base rates in the future. The state's twenty-month experience with its all-inclusive occupational disease compensation act, under which premiums were set at prohibitive rates, shows the wisdom of the new enactment.

Unsound Contract Requirements

IT IS AXIOMATIC in construction contracting that the owner may write the contract to suit his needs and wishes. When he makes the contract requirements too onerous, however, he works against his own interest by thwarting the intent and purpose of competitive bidding. In the case of public works it is the public interest that suffers.

The projects of the PWA Housing Division are examples of unreasonable and onerous contract requirements that are keeping the better class of contractors on the sidelines, decidedly to the public's loss. When huge building projects go begging for bidders in this time of building contract starvation, there must be something wrong. Recently the Harlem housing work attracted only four bids, two of them complimentary, and housing projects in Columbia and Charleston, S. C., did not draw a single bid.

Why? Because impossible conditions in the specifications and bidding requirements make the work so unattractive that even hungry contractors, men who are always ready to take a long chance, are unwilling to bid. Some of the objectionable features are written into the law, but most are the result of whimsical rulings on the part of the PWA authorities.

The chief fault lies in an unwarranted division of authority whereby the Housing Division prepares the plans and specifications, but supervision and inspection come under a separate Inspection Division reporting directly to the Administrator. Without knowledge of the intent of the planners, the inspectors can only interpret the specifications to the letter. Therein lies the rub, for the specifications are so carefully precise that the only interpretation possible is unattainable perfection.

Another objection is the excessive number of alternates, running more than 150 in one case. Obviously intelligent bidding is impossible under such circumstances. Still another is the requirement of approval by the contract officer before a man can be discharged, making the engineer the final judge of a workman's competence.

A committee of prominent New York contractors, working with officers of the Housing Division, prepared for the Administration a report listing all objections and containing sound suggestions for changes. PWA spokesmen chose to ignore the recommendations of the contractors, however. Their reply dodged the issue by striking at the contractors' unwillingness to live up to agreements, by denying red-tape practices that are of common knowledge, and by passing off the fiasco of no bids on the South Carolina projects with the inane comment, "there are no contractors in these two cities large enough to handle work of this magnitude."

It is plain that PWA's housing contracting procedure should be changed, in the interest of the public and that of the housing program.

Rebuilding the Delta

PASSAGE of the Overton bill and its prospective approval by the President mean that the long-delayed work of building a new delta for the Mississippi can now be pushed to completion. The Markham plan, which the bill adopts and authorizes, will develop a more effective and workable system of flood bypasses west of the Mississippi than contemplated in the incomplete 1928 flood-control plan for the river. In effect it will create a second river channel from the mouth of the Arkansas river to the Gulf. The plan includes other elements, but this is its vital part.

When the scheme of flood works now recommended by the Army Enigneers was adopted in 1928, Congress recognized two outstanding objectives: that all floods, even the greatest possible, should be passed without overtopping the levees that protect the bottom lands, and that the flood works be built quickly, before another inundation like that of 1927 could sweep over the basins. A ten-year period was therefore allowed for construction. That time is nearly up, and the lower river still lacks full protection—mainly because the west bypass, then intended to utilize the Boeuf valley west of the Tensas, could not lawfully be built under the confiscatory method proposed by the plan. With changed procedure, containing provision for purchase of flowage rights, and with extensive redesign of the bypass system, the new measure clears the way for completing the protective works.

High floods do not come often, but they are erratic and may strike at any time. It is quite possible that the next year or two will bring a repetition of 1927. For this reason it is important to remove the remaining danger by completing the protection. In fairness to the engineers it should be pointed out that in the meantime they have done remarkable things in increasing the floodflow capacity of the main river channel by cutting bends and removing obstructive bars and points. Flood stages have been so lowered through this work that six or seven feet more water can be carried than before. Nevertheless the construction of the bypass is urgently needed if the lower river is to be made really secure.

The operations under the Markham plan may not be the final step in the regulation of the Mississippi, as we said a year ago (*ENR*, April 4, 1935, p. 497). Further development, however, must wait on careful observation of the behavior of the river after completion of the contemplated works, for in dealing with the Mississippi it has been fully proved that experience with the river itself must always guide the planning of engineering measures. For the time being the plan now made official accomplishes the aims set nine years ago, and brings the Mississippi's floods under control.

CURRENT NEWS

PWA Withdraws Steel Contract

Action follows circuit court decision holding National Labor Board is limited in its jurisdiction

A CONTRACT of $40,086 for sheet piling on Imperial Dam in Arizona, previously awarded to Jones & Laughlin Steel Corp., Pittsburgh, was withheld by the Public Works Administration, June 16, because the company is charged by the National Labor Relations Board with discriminating against union labor at its Aliquippa, Pa., plant. Administrator Ickes' order followed a decision by the Federal Circuit Court of Appeals at New Orleans declaring against the National Labor Relations Board. The board is reported to have taken the case to New Orleans to get a court with a record friendly to the New Deal, in the first action brought to enforce its orders.

Boards' jurisdiction limited

The United States Circuit Court of Appeals at New Orleans held, on June 15, that the steel company was not engaged in interstate commerce and that, therefore, the labor board had no power over the company. The board had ordered Jones & Laughlin to reinstate employees allegedly discharged for union activity. The decision stated that, "The Constitution does not vest in the federal government the power to regulate the relation as such of employer and employee in production or manufacture.

"One who produces or manufactures a commodity, subsequently sold and shipped by him in interstate commerce, whether such sale and shipments were originally intended or not, has engaged in two distinct and separate activities. So far as he produces or manufactures a commodity, his business is purely local.

"So far as he sells and ships, or contracts to sell and ship, the commodity to customers in another state, he engages in interstate commerce. In respect to the former he is subject only to regulation by the state; in respect to the latter to regulation only by the federal government. Production is not commerce, but a step in preparation for commerce." The court quoted the recent Guffey Act decision.

The court further stated: "That the employer has a very large business, the interruption of which by a strike of employees which might happen, and that in consequence of such strike production might be stopped and interstate commerce in the products affected, does not make the regulation of the relation justified under the commerce power of Congress, because the effect on interstate commerce is too remote.

"Nor is it important that the employer imports part of his raw material in interstate commerce and sells and exports a large part of his product in interstate commerce, which imports and exports would possibly be stopped by a possible strike."

Overton Bill Signed

President Roosevelt signed the Overton Mississippi River flood control bill on June 15. The bill authorizes an appropriation of $272,000,000 to carry the Markham plan into effect and also includes a new method of compensating property owners for flowage damages.

Housing Bill Passes Senate

The senate passed the Wagner public housing bill on June 16. The bill makes no cash appropriation but authorizes the sale of bonds in an amount up to $150,000,000 the first year and a like amount for each of two succeeding years. The bill authorizes federal grants of 45 per cent of the cost of low-rent projects initiated by local housing authorities, with loans for the balance. The program as a whole will be supervised by a federal housing authority of five members.

385-Mile Railway to Be Built in Mexico

The recently organized Lineas Ferreas de Mexico, S.A., is about to construct 385 miles of line in southeastern Mexico to connect with the Yucatan Railway. The Lineas Ferreas is a semi-public corporation of which the controlling stock is owned by the federal government. Three contracts have been let. General Almazan will build a 136 mile section. The United Engineers of Philadelphia has a contract to build 124 miles of line. A tentative agreement has been entered into with a Dutch firm, the International Handles Consortium, The Hague, to construct about 125 miles of roadbed, including four large bridges. This section, including bridges, is expected to cost 6 or 7 million dollars. The contracts for the construction of this railway do not impose any obligation that materials be purchased from any particular country. All material purchases must be approved by the purchasing department of the Lineas Ferreas de Mexico.

Idaho Water Conservation Act Declared Unconstitutional

The Idaho supreme court has declared the 1935 state water conservation act unconstitutional under the state charter. The act was intended "to plan and carry out a comprehensive, statewide program for the conservation, development, storage, distribution and utilization of water for irrigation and domestic purposes." The law was held unconstitutional on the ground that: It conferred upon the conservation board unlimited powers of a private corporation, it authorized a state agency to monopolize or withdraw rights inherent in the people, and it placed no limitation upon the discretion of the conservation board.

Reclamation Fund Reduced by Congress

Senate appropriation of $57,610,000 was reduced in conference to $31,610,000

THE CONFERENCE report on the Interior Department appropriation bill was accepted by the House on June 15. As amended by the Senate, the bill provided an appropriation of $57,610,000 for western reclamation projects. This appropriation had not been included by the House. A compromise, reached in conference, reduced the amount to $31,610,000. Provision of $16,000,000 for the Central Valley project in California was dropped. The conference report includes $20,750,000 as an outright appropriation for Grand Coulee dam, Washington. The balance, $10,860,000, is apportioned among fourteen other projects, as follows: Gila, Ariz., $1,250,000; Salt River, Ariz., $1,500,000; Grand Valley, Colo., $200,000; Pine River, Colo., $1,000,000; Boise (Payette division), Idaho, $1,000,000; Boise (drainage), $160,000; Carlsbad, N. M., $900,000; Deschutes, Ore., $450,000; Owyhee, Ore., $200,000; Yakima-Roza, Wash., $1,000,000; Provo River, Utah, $500,000; Casper-Alcova, Wyo., $1,000,000; Riverton, Wyo., $250,000; Shoshone-Heart Mountain, Wyo., $700,000; administrative expenses on these projects, $750,000.

An identical provision of $57,610,000 is included in the Senate version of the deficiency (relief) bill, now in conference, and it is probable that the Central Valley project will be taken care of from this appropriation, as the House rule for the consideration of this bill does not permit an individual vote on any of its provisions except those covering the PWA work program and the Florida Canal.

Dredges at Fort Peck Dam Set New Record for Output

During May, 1936, the four electric dredges at Fort Peck Dam pumped 3,734,000 cu.yd. of fill into the dam. The month's yardage exceeded that of the previous high month, October, 1935, by over 100,000 cu.yd. The dredging plant was designed for a capacity of 3,000,000 cu.yd. per month. Since start of dredging operations in October, 1934, a total of 27,467,000 cu.yd. has been placed.

Bids will be opened July 7 at Fort Peck for 765,000 cu.yd. of riprap stone ranging from spalls weighing 25 lb. per stone to blocks of 7 tons weight. As no suitable stone exists in the vicinity of the dam, the riprap will probably come from a quarry in the Montana Rockies, perhaps 400 or 500 miles away. The government will provide railroad connection to the quarry. Delivery of stone must commence at the rate of 1,000 cu.yd. daily within 30 days after award of contract.

State Court Upsets Flood Control Plans

Washington Supreme Court holds assessments for flood control work must be proportional to benefits received

THE WASHINGTON State Supreme Court has held that flood control districts may not levy assessments on lands within the district which are not benefited by the flood control projects.

The 1935 state flood control act established a mechanism for setting up flood control districts in the state of Washington. Upon petition of ten landowners, a boundary commission would be appointed to lay out boundaries for the district. A majority vote of property owners in the district is necessary for the establishment of the district. The act further provided that a district may raise revenue by the levy of an annual tax, to the extent of two mills on the dollar in any one year, on all the taxable property within the district; five mills on the dollar may be levied when the proposition is adopted by a majority of voters at a general or special election.

Formation of first district

On June 10, 1935, the Pierce county flood control district No. 1 was organized. At that time the Weyerhaeuser Timber Co. filed objection, but the state proceeded with plans, and the district was established.

In the case which the court has just decided, the timber company claimed that its lands within the district are located at an elevation such that no possible damage could result to them by floods, nor could any of such lands in any way damage any other lands.

The state flood control director testified that the theory upon which the boundaries of the district were established was that the district was a quasi-municipal corporation with limited taxing powers, and not a special benefit assessment district; that, therefore, the question of benefits to individual property was not considered, so long as the community generally was benefited; that the district was formed on the theory of including sufficient land to produce the required amount of money; and that it would be impossible to create districts if timber lands were not included.

The court held that, inasmuch as the timber lands were in no way benefited, they could not lawfully be included within the district.

N.Y.U. to Offer Housing Course

The School of Architecture and Allied Arts of New York University has announced that a group of courses on housing will be offered in the 1936-37 curriculum. The courses will be under the direction of Carroll Aronovici. Two courses, The Urban Community, and Housing, will be offered, each for two hours a week throughout the year. Specialists in the various fields under discussion will participate in the lecture courses or discussions. In addition, a seminar will be given, in housing and community planning, for advanced students. Opportunity will be offered to advanced students to do practice work in the offices of persons or official agencies doing work on housing problems.

Unemployment Survey To be Made

The Council for Industrial Progress has established a committee to maintain a running inventory of unemployment, which will determine currently who are the unemployed and where they are, and which will give a more comprehensive picture of trends and of progress made in providing jobs in private enterprise. The group, with equal representation of management and labor, will conduct no research and collect no statistics. It will work with existing government statistical agencies, including the Bureau of Labor Statistics, Bureau of the Census, United States Employment Service, the various emergency agencies, and will seek the cooperation of industry to secure the needed information. The committee includes Paul S. Hanway, National Fibre Can & Tube Association, New York; Henry Dennison, Dennison Manufacturing Company.

Building Material Show

A permanent display of architectural building material was opened early this month by the treasury department at Washington. The display will include nearly all natural and manufactured architectural materials produced in this country. A series of displays by 21 trade associations will occupy eleven rooms.

The major purpose is to provide a technical reference museum for the convenience of federal and general architects in connection with the design and construction of federal buildings.

NEW LABORATORY FOR THE U.S. BUREAU OF PUBLIC ROADS

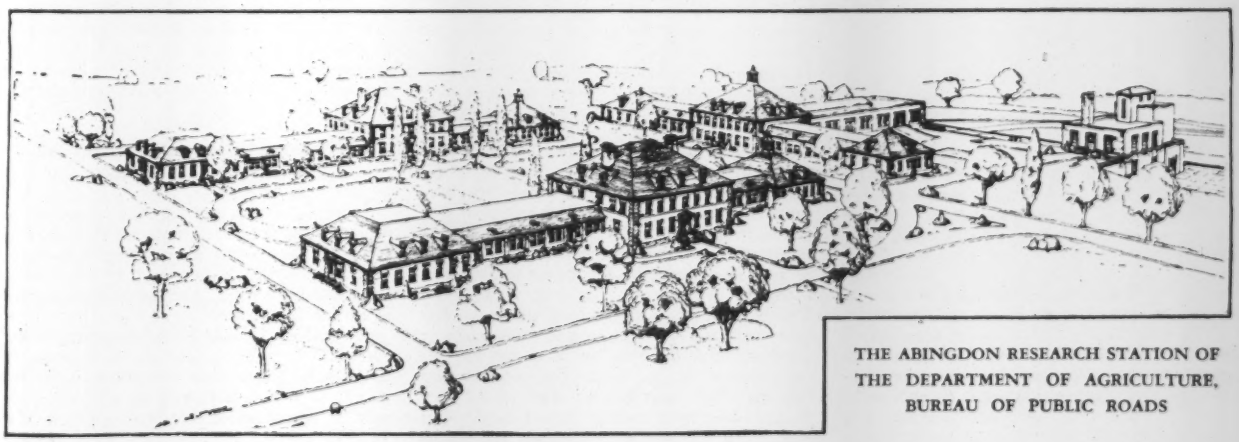
Plans for the research station of the Bureau of Public Roads at Abingdon, Virginia, have recently been completed and bids will be called soon for construction of the unit shown in the accompany sketch. Completion of the buildings and the outdoor testing facilities for work such as has been carried on at the Arlington Experiment Station will give the bureau facilities it has desired for many years—laboratories adequately equipped and housed, and a considerable area for outdoor tests on a permanent location. Permanent development has not been practicable in the past at Arlington as it has been known that the land occupied would eventually be taken for other government use.

The new site at Abingdon consists of 54 acres overlooking the Potomac River on the George Washington Memorial Highway and is two miles from the bridge across the Potomac at Washington. The land was acquired by purchase when areas adjacent to the George Washington Memorial Highway were being bought, in order that the federal government might control development along the highway. Buildings shown in the architect's sketch are to be erected at this time to house the division of tests. Space is available for the erection of additional buildings and it is probable that in future years there will be a transfer of additional functions of the bureau to this site.

The building at the left of the central court will house bituminous investigations and subgrade soil research. The building opposite will be used for structural tests, and investigations on concrete and other nonbituminous materials. A two-story bay in each of these wings will be available for high testing equipment such as that used in impact studies and in bridge tests. Air conditioning is to be provided in those rooms where control of humidity and temperature will be of importance in making tests.

The center building will be used for the machine and carpenter shops and as a garage. The small building at the right will contain the central heating plant and space has been provided for the installation of a diesel engine and electric generator should it be decided to generate power for the station.

Funds authorized by Congress in 1931 and in 1934 have been partly used for the purchase of land and preparation of plans. It is expected that additional funds sufficient to complete the structures shown will be provided in legislation now before Congress.



THE ABINGDON RESEARCH STATION OF THE DEPARTMENT OF AGRICULTURE, BUREAU OF PUBLIC ROADS

Contractors Protest PWA Requirements

Metropolitan Builders object to separate inspection, lack of control of personnel, and to other stipulations

FOR TWO MONTHS a special committee of the Metropolitan Builders Association, an organization of the leading building contractors of New York City, has endeavored without success to have certain objectionable contract requirements of the PWA Housing Division changed. The contractors contend that the objectionable features are responsible for the small number of bids received for the Harlem housing project and the complete lack of bids for similar projects in Charleston and Columbia, S. C. It was the desire of the committee to have the changes made before a call for bids on the Ten Eyck housing project in Brooklyn, now scheduled for July 28.

Points at issue

The contractors were interested in three major and several minor points. Major changes desired included: (1) Elimination of the inspection division and duplication of authority between the housing division and the inspection division; (2) the establishment of yardsticks to determine limits of tolerance in workmanship; (3) a drastic reduction in the number of alternates. Minor changes desired included splitting of the project into three or four units, permitting contractors to bid on any or all units; lengthening of construction time schedule; reduction of $500 daily penalty for noncompletion on schedule. They also asked for elimination of the following: laboratory testing at contractor's expense, the right of the government arbitrarily to take over the work, the right of the contracting officer to have final say on discharge of a workman; and the right of the government to demand copies of all subcontracts.

Contractors confer with PWA

Several meetings were held at which the contractor's committee, headed by M. E. Kalette of Jas. Stewart & Co., and housing division officials, including A. R. Clas, Director of Housing, were present. The only changes the contractors were able to get through were dividing the Ten Eyck project into three bidding units and an extension of scheduled time of completion. Mr. Clas suggested that a sample apartment be built, which would serve as a standard for construction, but this has not yet been approved by the PWA Administrator, and is not acceptable to the contractors. The housing division had an answer for all other objections, including the statement that some of the contract requirements are written into the law and therefore cannot be changed. The contractors' recommendations were submitted to Administrator Ickes, but at this writing no reply had been received.

Inspection difficulties

The contractors feel that the division of architectural and inspection authority is most serious. In normal building construction the architectural planning, the preparation of plans and specifications, and the supervision and inspection of construction are all under one authority. On the PWA housing work the authority of the architectural department ends with preparation of plans and specifications, with the exception of approval of samples. Supervision and inspection of construction are under a separate inspection division. Without knowledge of intent or purpose of the architects, the inspectors have only the letter of the specifications upon which to base their direction and decisions. Plans and specifications have been so prepared, the contractors claim, that the only interpretation is absolute perfection in construction. Such perfection is impossible, according to the contractors, in view of the fact that under PWA labor regulations they must employ labor sent out by the re-employment office; further, final decision as to a workman's competency rests with the contracting officer. The contractors feel that they should have more control over the selection and firing of workmen if they are to be held to close limits of tolerance in workmanship.

Failing in its efforts to have the contract requirements changed to any extent, the contractor's committee predicts a dearth of first-class bidders on the Ten Eyck project.

CLEVELAND PREPARES THE LAKEFRONT SITE FOR ITS GREAT LAKES EXPOSITION

Construction activity involving land filling, bridges, buildings, and roads has dominated a 150-acre lakefront site in Cleveland for the past three months, in preparation for the opening of the city's Great Lakes Exposition on June 27. With its main entrance designed as an extension of the Mall, the fair will be easily accessible from the business and hotel districts. Dredging, fill, and some landscaping and highway work, involving over a million dollars expenditure, are permanent items that will aid the city in its waterfront and Mall development plans.

The fair is planned to dramatize the basic industries of the region, which are dominated by steel production and corollary manufacturing. Some of the buildings to be used are novel structures and include, among other items, steep pitched scissor trusses of 60-ft. span, 31½ ft. high, and a series of two-span timber rigid frames, 60 ft. wide, designed on the stressed-covering principle (*ENR*, May 21, 1936, p. 751). Bridges are substantial structures but are of a temporary nature, except for a short steel-girder viaduct on the line of Ninth St., leading down to the lakefront piers. The predominant building enclosure material is plywood. Streets and sidewalks are cold-laid asphalt; concrete curbs are used. More insulated walls are used than at previous fairs because of the greater number of air conditioned buildings.

In the foreground of the above view are the Hall of Progress, the Automotive Building, and the grandstand (adjoining the railroad) before which the transportation pageants will be held. To the left of these structures the site stretches along a mile of lakefront on which amusement features will be accommodated. Across the railroad tracks is the Cleveland City Hall, and behind it the municipal auditorium, the scene of last week's Republican national convention. To the right of the city hall is an underground exhibition hall reached from ramps in the block to the right of the auditorium. At the far end of this block, fronting on St. Clair Ave., the white pylons mark the main entrance to the exposition grounds. This entrance block, designated Symphony Gardens, will be devoted to concerts. The multi-story building in the right foreground of the picture is Horticultural Hall which adjoins the municipal stadium. The construction to the left of the Hall is a grandstand facing a floating stage.

The rapidity of progress is shown by a comparison of this picture, taken last week, with the picture on the cover, taken May 25.

Grand Coulee Construction Ahead of Schedule

John G. Page, acting commissioner of reclamation, reports that construction of Grand Coulee Dam is six months ahead of schedule. Only 37 per cent of the alloted time has been used; the contract, however, is 51 per cent complete.

A total of 18,853,000 cu.yd. of earth and rock had been excavated at the damsite up to June 6. Since Dec. 6, a total of 516,000 cu.yd. of concrete has been placed in the dam in the west excavation. During May 182,970 cu.yd. of concrete were poured.

Washington Highlights

By Paul Wooton

SPONSORS of the 57th St. Hudson River bridge at New York are hopeful that the House will pass, before adjournment, the bill to establish a commission to recommend under-clearances for the bridge. The bill, passed by the Senate Feb. 6, was favorably reported by the House committee on Interstate Commerce June 2. Rep. Kenney, of New Jersey, is seeking a rule that will bring the bill before the House.

Construction of the bridge has been authorized by Congress, but the War Department has refused to fix the clearances over the river, on the ground that there is no need for its construction. The bridge now is designed exclusively for rail, rapid transit and pedestrian traffic. Provision for highway traffic has been eliminated to meet objections of the city and Port Authority.

In a minority report from the House Committee, Representatives Peyser, Wadsworth, and Merritt asserted that Congress seldom overrides the views of the War and Navy departments on such legislation, and pointed to the opposition of the Port of New York Authority, Maritime Association, New York Chamber of Commerce, and others.

The bill authorizes an appropriation of $1,000 to defray the expenses of a five-man commission to be appointed by the President from the Corps of Engineers, Navy, Interstate Commerce Commission, Bureau of Navigation, and Bureau of Foreign & Domestic Commerce.

Representative Wilcox of Florida has introduced a new municipal bankruptcy act closely modeled on the old stature which was declared unconstitutional, but with minor modifications which will, he believes, overcome the scruples of at least one member of the court, all that would be needed to swing the 5-4 decision in the other direction.

Accepting the court decision as sound, Mr. Wilcox reasons as follows: As previously passed, the act was unconstitutional because it usurped states' rights. Under the Constitution, the states may enact bankruptcy laws, but are specifically forbidden to impair contract obligations. Therefore, the states' power extends only to future obligations, and cannot affect existing debts. Consequently, by limiting the new federal law to obligations existing at the time of its passage, no rights of the states will be affected, and the objection of the court will be met.

The proposed bill validates all actions and proceedings under the old law insofar as they affect obligations in effect on May 24, 1934, the date of its approval, and permits the continuation of pending proceedings subject to the same limitation.

To avoid duplication in federal flood control efforts, Acting Budget Director D. W. Bell, under instructions from the President, has requested that all government agencies keep the National Resources Committee informed concerning flood control studies which they may have made or have in contemplation. The following information will be submitted:

(1) Character, purpose, scope and probable duration of the activity.

(2) If project is required by law, reference to the specific statute.

(3) Number of persons to be employed during the current fiscal years, and their salaries.

(4) Cost estimate for the entire period, and for the current fiscal year.

(5) The appropriation to which expenses will be charged.

Agencies submitting reports will be advised as to what work of similar nature has already been done, or is being planned, by other branches of the government.

It is probable that the Senate, in order to protect the Reclamation appropriation from further tampering by the House, will not adopt the conference report on the Interior Department bill until after the House acts on the conference report on the relief bill. The relief bill is not expected to emerge from conference until the latter part of the week.

Brief News

COMPLETION ON JUNE 10 of Ryepatch storage dam on the Humboldt River in Nevada was reported by John B. Page, acting reclamation commissioner.

WATER DISTRIBUTING SYSTEMS in Sheffield and Tuscumbia, Ala., including all allied equipment, have been purchased by the city of Sheffield from the Alabama Water Service Co. for $350,000. Revenue bonds, bearing 4½ per cent interest, repayable over a period of 30 years, will be issued to finance the system. Water rates will remain the same. A provision is made that after the plant has paid for itself, the Tuscumbia system will be given to that city.

THE LOUISIANA HOUSE OF REPRESENTATIVES has passed, unanimously, a number of bills providing for the issue of bonds to cover extensive highway and bridge work in the state. The work includes: construction of the $5,500,000 Baton Rouge bridge across the Mississippi, building of a causeway across Lake Pontchartrain, completion of the paved highway route around Lake Pontchartrain and a major paving program in New Orleans. Among the bills is one which would permit the city of New Orleans to fund a one cent per gallon gasoline tax into a $6,000,000 bond issue to provide funds for highway and other permanent public improvements. The bond issues authorized amount to more than $30,000,000. Early passage by the Senate is expected.

THE ARKANSAS POWER AND LIGHT CO. has filed a petition with the Arkansas State Department of Public Utilities asking for authority to purchase the municipal water distributing system at Magnolia, Ark., which has been operated by a waterworks improvement district. The district was organized in 1924, but was unable to sell sufficient bonds to complete a water plant. After the distributing system was constructed, the district entered into an agreement with the Citizens Electric and Ice Co. to operate deep wells, stand pipes, reservoirs and a pumping plant to supply water to the distributing system. The Arkansas Power and Light Co. acquired the property of the Citizens company in 1927 and continued the agreement to supply water to the distributing system. The petition states that the company has invested about $47,636 in the water property, and that the company has entered into an agreement to acquire the distributing system and to assume principal and interest payments on $46,000 worth of district bonds.

Partial Approval For Quebec Railway

C.P.R. may build part of its proposed line in new mining area—C.N.R. raises strong objections

THE Canadian Pacific Railway has obtained approval, from the Railway Committee of the Quebec legislature, for only a portion of its proposed line into the mining area of northwestern Quebec. (*ENR*, May 14, 1936). The application, as approved by the committee, has received its first reading in the House of Commons, where it encountered considerable opposition. Further action was prevented by the resignation of Premier Taschereau and the consequent dissolution of Parliament.

Line to Rouyn approved

The proposed line would start at Angliers, the present railhead of the Lake Temiskaming branch of the C.P.R., and extend north to Rouyn where it would make contact with a branch line of the C.N.R., thence northeast to Senneterre, where it crosses the C.N.R. transcontinental line, thence northeast to Lake Chibougamau. The Canadian National Railways opposed the motion, claiming that this is an area which was opened up and developed by the C.N.R. and its predecessors. The C.N.R. also announced that it was seeking powers through the federal Parliament to construct a second branch line from its transcontinental main line into the newly developed area. The C.N.R. plan included a line from Rouyn to Senneterre. Objection was also raised by the publicly-owned Temiskaming and Northern Ontario Railway, which also serves the mining area.

No extension north of C.N.R.

The committee, after a vote, agreed to the C.P.R. proposal, only to the extent of reporting favorably on the portion of the line between Angliers and Senneterre. The further extensions were rejected. The condition was also imposed that branches from the proposed line run only to the south, so as not to enter the territory served by the existing lines of the C.N.R. A strong desire exists in the territory located between Angliers and Rouyn for railway service, which may not be obtained if the C.P.R. proposal is withdrawn.

Other extensions proposed

On June 5 another application was made to the Quebec Legislature, by Quebec Goldfields Transportation Co., for permission to construct a line from Mont Laurier (the terminus of a C.P.R. branch line, running direct from Montreal) to Val d'Or, in the Abitibi district. The proposed line would pass through Maniwaki, the terminal point on another C.P.R. branch line, this one running direct from Ottawa. This proposal was also strenuously opposed by the C.N.R., on the same grounds as provided the opposition to the Rouyn-Senneterre line, namely, that the C.N.R. had developed the region first, and should not have to face competition. The railways committee has reported this application favorably.

Ottumwa Courier Photo

DES MOINES RIVER CROSSING AT OTTUMWA DEDICATED

The new bridge spanning the Des Moines River at Ottumwa, Ia., which was dedicated on May 28 includes a five-span continuous truss. Both piers and superstructure were built by the Wisconsin Bridge and Iron Co. of Milwaukee, at a cost of $303,004 to the Iowa state highway commission. An additional expense of $300,000 was borne by the city of Ottumwa for purchasing the approach sites and building the approaches. U. S. Highway 34 is being routed over the new bridge.

Although this is the fourth bridge to span the Des Moines River at Ottumwa, the new structure, by allowing underpasses for 13 railroad tracks, will be the first one to be free from railroad grade crossings.

G. A. Johnson has been superintendent of construction for the contractor and R. C. Boyd resident engineer for the highway commission.

SOCIETY CALENDAR

INTERNATIONAL CONFERENCE ON SOIL MECHANICS AND FOUNDATION ENGINEERING, Cambridge, Mass., June 22-26, 1936.

SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION, annual meeting, Madison, Wis., June 23-26.

HIGHWAY SAFETY CONFERENCE, Ames, Iowa, June 29-July 2.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Atlantic City, N. J., June 29 to July 3.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual convention, Portland, Oregon, July 15-17.

CANADIAN GOOD ROADS ASSOCIATION, annual meeting, Charlottetown, P.E.I., September 1-3.

PENNSYLVANIA SEWAGE WORKS ASSOCIATION, annual conference, State College, Pa., June 24-26.

NEW ENGLAND WATER WORKS ASSOCIATION, annual outing, North Scituate Beach, Mass., June 25.

THE NORTH AND SOUTH CAROLINA SECTIONS, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, and SOUTH CAROLINA SOCIETY OF ENGINEERS, joint summer meeting; Myrtle Beach, S. C., July 10-11.

AMERICAN WATER WORKS ASSOCIATION, FOUR STATES SECTION, at its April 23 meeting in Baltimore, Md. elected the following officers: Chairman, EZRA D. WHITMAN; Vice-chairman, HARRY N. FREEBURN; Secretary-treasurer, CARL A. HECHNER.

ENGINEERING SOCIETIES OF NEW ENGLAND, at their annual meeting, June 2, elected the following officers: President: FREDERICK W. BLISS. First Vice-president: PROFESSOR HAROLD K. BARROWS. Second Vice-president: HOLCOMBE J. BROWN. Secretary: JOSEPH PETERSON. Treasurer: LEON F. JACKSON.

EXAMINATIONS for registration as Engineers, Land Surveyors and Architects will be held as follows:

NEW YORK—Examinations for engineers at Albany, New York, Syracuse and Buffalo, June 22-24.

SOUTH CAROLINA examinations for engineers and land surveyors at the office of the State Board of Engineering, 1218 Senate Street, Columbia, S. C., July 14, 1936. Applications must be filed with the secretary of the board before July 2.

Personals

FRANK M. LINNAN has been elected city engineer of Wauwatosa, Wis. He succeeds F. A. Torkelson, who resigned last January.

JOHN ROEHM, of Chicago, has been appointed engineer of the Territorial Department of Mines, Juneau, Alaska.

DAVID C. WIGGIN, has been appointed assistant in sanitary engineering at the Graduate Engineering School of Harvard University.

HARVEY NATHANIEL DAVIS, president of the Stevens Institute of Technology has received the degree of Doctor of Engineering from New York University.

COLONEL M. C. TYLER, formerly in charge of the Great Lakes Division, has been transferred to the Washington, D. C., office of the United States Engineers.

COLONEL L. V. FRAZIER has taken over his new assignment as head of the Great Lakes Division of the United States Engineer Department. Colonel Frazier, before his present assignment, was commandant of the Engineers School at Belvoir, Va.

A. E. PEARLMAN, formerly assistant engineer of maintenance of way, Burlington Railroad, has been appointed engineer of maintenance of way for the Denver & Rio Grande Western Railroad.

ARTHUR E. HILLIARD has been appointed assistant engineer with the department of hospitals in New York City. Mr. Hilliard has previously worked with the Reliance Advertising Co. in Arkansas and Louisiana and as shop engineer for the Board of Water Supply of New York City.

R. E. BOOTH has been made general superintendent and division engineer of Coachella Division, Metropolitan Water District of Southern California, in charge of force account construction on 35 miles of tunnel and 5 miles of concrete con[duit]. For the past three years Mr. Booth [has] been division engineer, on Division [I] of the district.

P. W. STEELE, formerly senior engi[neer] with the Bureau of Reclamation, has ta[ken] the position of chief designing engi[neer] with T.V.A. Mr. Steele has been c[on]nected with the Bureau of Reclamat[ion] since 1921, and since 1927, he has been [in] responsible charge of the dam division.

BRIG. GEN. GEORGE R. SPALDING, divisi[on] engineer, U. S. Army, New York, recent[ly] promoted to the rank of brigadier gener[al] of the line, terminated his service wi[th] the Corps of Engineers on June 1, and w[as] appointed assistant chief of staff in charg[e] of the supply division of the General Sta[ff] of the War Department at Washington.

PAUL EMILE BOURBONNAIS has been a[p]pointed chief engineer of the Quebe[c] Streams Commission, replacing O. [G.] Lefebvre, who resigned on being appointe[d] one of the Quebec Electricity Commissioners. Mr. Bourbonnais graduated fro[m] Ecole Polytechnique, Montreal, in 1914; h[e] was appointed assistant chief engineer t[o] the Streams Commission six years ago.

CHAS. P. WILLIAMS, of San Diego, California, who for several years has been consulting engineer to the National Irrigation Commission of Mexico, in connection with the design and construction of the Rodriguez Dam in Baja California, Mexico, is now stationed in the office of the commission in Mexico City, as consultant on the design of a number of important dams and other structures, soon to be constructed by the Mexican Government.

NOEL S. ANDERSON, senior highway engineer of the Bureau of Public Roads, has been appointed acting district engineer for district No. 14. This district includes Virginia, West Virginia, North Carolina, and South Carolina, with headquarters at Spartanburg, S. C. The appointment is to fill the vacancy created by the recent death of Charles C. Moorefield. Mr. Anderson was with the South Carolina highway department from 1918 to 1931, serving as chief of construction and in other capacities. Since 1931 he has been a member of the engineering staff of the Bureau of Public Roads, with headquarters at Montgomery, Ala.

Obituary

LINCOLN H. POOLE, for many years a prominent contractor in Portsmouth, Ohio, died in Portsmouth, June 10.

HUGH WHITE, who retired in 1933 as chairman of the board of the George A. Fuller Co., died at Scarsdale, N. Y., at the age of 59.

LOUIS H. MCALOON, active in Massachusetts contracting for the past 38 years, died in North Andover, Mass., on April 27, at the age of 61 years.

JOHN BRUNNER, consulting engineer for the Illinois Steel Co., 69 years old, died June 15 at Evanston, Ill. Mr. Brunner was born in Sweden and received his engineering training there. He came to America in 1888 and became a citizen in 1893. He was an assistant engineer to the Boston & Maine R.R. until 1890, and with the Carnegie Steel

Co. in Pittsburgh until 1896. From 1899 to 1902 he served as head of the Bureau of Engineering and Construction in Pittsburgh. He had been employed by the Illinois Steel Co. since 1902.

EMILE B. NORMANDEAU, chief engineer, Department of Colonization, Quebec Government, died June 1, age 58. Mr. Normandeau was associated with the National Transcontinental Ry. prior to his taking service with the provincial government.

WILLIAM T. LORREE, for many years connected with the engineering department of the Pennsylvania R.R. and the Baltimore & Ohio R.R., until his retirement in 1925, died June 7 in New York City at the age of 75.

A. STANTON GINN, formerly sanitary engineer for Los Angeles County, Calif., died at South Bend, Ind., on May 7. Mr. Ginn was honored by the late Theodore Roosevelt for his part in building the Panama Canal.

JOSEPH J. MALLOY, president of the highway contracting concern of J. J. Malloy, Inc., died in Schenectady on June 8 at the age of 73. Mr. Malloy has been active in highway and railway contracting in the neighborhood of Schenectady for the past 40 years.

ROBERT WENTWORTH MACINTYRE died June 2 at the age of 68. Mr. MacIntyre was formerly chief engineer for the Department of Public Works in the Northwest territory and chief engineer for the government of British Columbia on the construction of the Pacific Great Eastern Ry.

ROBERT WHITTEN, 62, director of the Division of State Planning of New York State, died June 6 in Albany. Mr. Whitten has been active as a consultant on city planning since 1915.

GEORGE KAUFMAN, 79 years old, mining engineer, died on June 8, in Plymouth, Calif. Mr. Kaufman had been chief mining engineer for the American Smelting Company in its Mexican operation until his retirement in 1926. Recently Mr. Kaufman has been inspecting gold mining properties in Alaska for J. P. Morgan.

CONSTRUCTION STATISTICS FOR THE WEEK

ENGINEERING construction awards for the week total $57,621,000, the highest week since Jan. 9. This total comprises private work at $11,618,000 and public at $46,003,000, of which $36,215,000 is state and municipal and $9,788,000 federal. Both private and public work are almost double the volume for the corresponding week last year. Federal contracts while below last year are the second highest this year. Corresponding values a year ago are: total, $32,379,000; private, $6,186,000; public, $26,193,000; state and municipal, $13,982,000; federal, $12,211,000.

The greatest gain this week is in public buildings which at $17,943,000 are also the highest since Jan. 9. All other classes have risen with the exception of sewerage and industrial buildings. The volume by classes is: commercial buildings, $6,900,000; industrial buildings, $2,925,000; streets and roads, $11,700,000; bridges, $4,883,000; waterworks, $1,224,000; sewerage, $365,000; earthwork and waterways, $3,998,000; unclassified, $7,683,000.

The larger projects include: Medical college, Syracuse University, Syracuse, N. Y., $825,000; high school, Ogden, Utah, $725,000; new unit at Medical Center, Jersey City, N. J., $2,037,000; plumbing, heating, electrical work for Public Schools 113 and 239, Brooklyn, N. Y., $674,000; children's hospital at Sea View Hospital, Dongan Hills, N. Y., $749,000; superstructure Central Nurses' Residence, Welfare Island, New York, N. Y., $1,387,000; senior high school, Providence, R. I., $1,642,000; additional buildings for Bureau Engraving and Printing and new building for Economics Bureau, Washington, D. C., $4,657,000; highways, by Ohio, $505,000; by Mississippi, $1,816,000; by Texas, $1,378,000; by Wisconsin, $1,569,000; water pipe and fittings, Los Angeles, Calif., $559,000; dredging Cape Cod Canal, Massachusetts, $3,072,000; revetment in Missouri River at Decatur, Neb., $788,000; grading and filling Flushing-Meadow Park for World's Fair, Flushing, N. Y., $2,186,000; industrial terminal, Bayonne, N. J., $3,549,000; 100 mi. oil pipe line, Home Oil & Refining Co., Great Falls, Mont., $675,000; 25,000 tons steel pipe for pipe line, Shell Oil Co., Los Angeles, Calif., est. $1,000,000. Amount shown under "Contracts-Weekly Average" in the chart below are in error.

CONTRACTS
(Thousands of Dollars)

	Weekly Average June 1935	Prev. 4 Weeks	Week June 18 1936
Federal Government	$6,704	$3,111	$9,788
State and Municipal	11,161	22,458	36,215
Total public	$17,865	$25,569	$46,003
Total private	9,675	12,073	11,618
Week's total	$27,540	$37,642	$57,621
Cumulative to date:			
1935..$625,446,000		1936..$1,074,010,000	

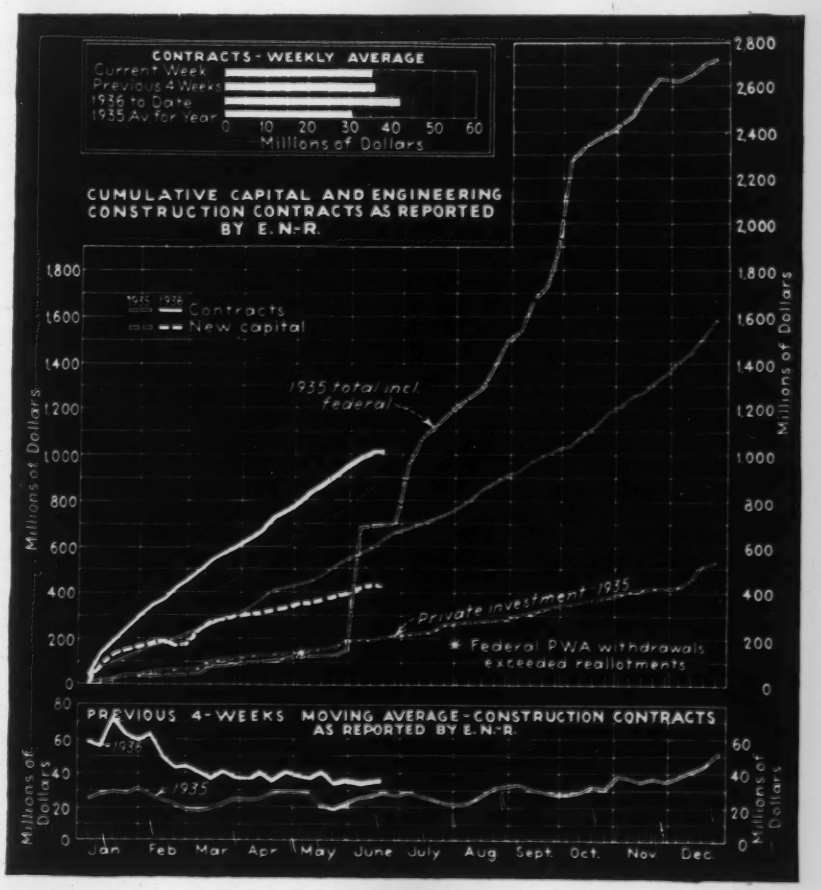
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1936	Week June 18	Cumulative
State and municipal	$6,091	$265,202
PWA non-federal	....	36,183
RFC loans	....	12,008
Corporate issues	....	117,350
PWA loans, Private	....	3,270
Total Non-Federal	$6,091	$434,013
Federal	....	4,955
Total new capital	$6,091	$438,968
Cumulative to date:		
1935...$683,105,000		1936...$438,968,000

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for federal construction, deficiency act funds.

INDEX NUMBER

ENR Cost	1913 = 100	1926 = 100	ENR Volume	1913 = 100	1926 = 100
June, 1936	204.60	93.35	May, 1936	149	65
May, 1936	203.40	97.77	Apr., 1936	166	73
June, 1935	194.78	93.63	May, 1935	130	57
1935 (Av.)	195.22	93.84	1935 (Av.)	135	58
1934 (Av.)	198.10	95.23	1934 (Av.)	114	50
1933 (Av.)	170.18	81.80	1933 (Av.)	102	47



Construction Equipment and Materials

Auxiliary Truck Transmission

An auxiliary transmission to provide dual axle ratio for trucks requiring a powerful underdrive is now being supplied by the H. S. Watson Co., San Francisco, Calif. The unit has been developed to give underdrive and direct axle ratios to trucks on short hauls where high power or slow travel is necessary. This underdrive auxiliary transmission is made by the Spicer Manufacturing Corp. and is distributed by the Watson company. The unit is installed in back of the factory-equipped transmission of trucks ranging from 1- to 3-ton capacity and provides eight amplified-power forward speeds.

Recorder Designed to Register Snow, Rain and Temperatures

An instrument designed to record rain, snow and temperatures over a period of many months without attention has been put on the market by Luepold, Volpel & Co., Portland, Oregon. It is from a design made by J. C. Stevens of that city and is called the Stevens Snow-Rain Recorder.

The recorder is designed primarily for isolated locations and may run for any length of time up to a year with one setting. It gives a graph of accumulated precipitation in inches and a continuous graph of temperatures.

The snow or rain collector is mounted on top of the housing which communicates through a conductor with a storage tank supported on a weigh-beam. One end of the beam is supported by a very accurate spiral tension spring. As the tank becomes loaded with either rain or snow, the spring extends and the movement is magnified and recorded on a strip chart in terms of precipitation inches of water. The entire mechanism is contained within a weatherproof, metal housing. It must be mounted on a platform so as to be above the deepest snow.

In order to insure uniform deposition of snow in the tank during high wind, a wind motor is attached to the housing. Its function is to turn the storage tank slowly when the snowfall is accompainied by heavy winds. Projecting from the top of the collector is a short arm with knife edges which is revolved by the motor to keep the opening free.

Business Notes

THE CHICAGO PNEUMATIC TOOL CO. has opened a new sales and service branch at 2415 Commerce St., Dallas, Texas. Mr. D. G. Reeder will be district manager.

THE CAMERON AND BARKLEY CO. of Florida have become distributors for the tubular products of the Republic Steel Corp.

CARL LAGER has been elected president, and Pierce J. McAuliffe, vice-president and general manager, of the Morris Machine Works of Baldwinsville, N. Y.

THE CORRUGATED STEEL SHEET PILING CORP. has purchased the corrugated piling department of the Youngstown Pressed Steel Co.

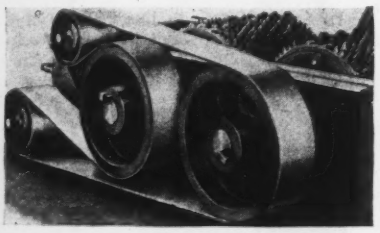
THE OHIO LOCOMOTIVE CRANE CO. have appointed Mr. H. E. Mensch, 424 Book Building, Detroit, as district sales agent for the Michigan territory.

New Small Ditcher

Barber-Greene Co., have changed their small ditcher to permit digging to a depth of 5 ft. The buckets are adjustable for an 8 in. or 11 in. cut. This ditcher was developed for use in lowering gas lines and, with its 48 in. overall width and vertical boom, is claimed to be well adapted for any ditching work in close quarters.

Pneumatic Wrench

The Independent Pneumatic Tool Co. have introduced the "Hamerench," a pneumatic wrench in which the torque is built up by rapid blows, 1,800 per minute, operating on a ratchet and pawl assembly. It is claimed that this action gives unusual starting power on obstinate nuts. The main axis of the tool is at right angles to the bolt; hence a clearance of only 8 in. is required around the nut.



QUICK ADJUSTING DOUBLE ROLL CRUSHER
The Jeffrey Mfg. Co. of Columbus, Ohio, have developed a new design of double roll crushers. The chief feature of this machine is a self-contained endless belt drive between the rolls which allows quick adjustment of the rolls, within the limits of the sizing rings, while the machine is running. The crusher is mounted on an all steel frame having heavy steel cross ties.

Portable Detector For Hydrogen Sulphide

The Mine Safety Appliances Co., Pittsburg, Pa., are presenting a detector for atmospheric hydrogen sulphide, which any workman can operate, and which is light and easily carried. The apparatus consists of a rubber bulb, a scale, and a set of detector tubes. The air to be tested is drawn through the detector tubes with the bulb. The detector tube contains a white, granular chemical, held in place in the tube between two plugs of glass wool. This chemical reacts with any hydrogen sulphide present in the sample and turns dark gray in color, beginning at the end where the sample enters. The length of travel of this discoloration through the granules is proportional to the percent of hydrogen sulphide in the atmosphere under test, and the concentration may be read directly on the graduated scale. The instrument, it is claimed, gives accurate readings, in less than a minute, of concentrations ranging from 0.0025 to 0.04 per cent by volume.

New Publications

GYPSTEEL PLANK, American Cyanamid & Chemical Corp. 8½x11, 28 pages. *Catalog and description.*

AUTOVENT, Autovent Fan & Blower Co., Chicago, Ill. 9x11, 25 pages. *Catalog and capacity tables.*

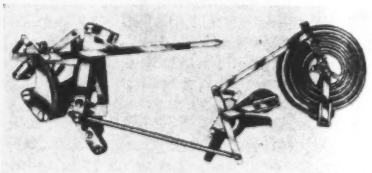
PHILADELPHIA MOTOREDUCER, Philadelphia Gear Works, Philadelphia, Pa. 9x11, 28 pages. *Dimension and capacity tables.*

TONCAN IRON PIPE, Republic Steel Corp., Cleveland, Ohio. 8½x11, 64 pages. *Descriptive matter and tables.*

FACTS FOR USERS OF A-C MOTORS, Lincoln Electric Co., Cleveland, Ohio. 9x11, 6 pages. *Capacity and price tables.*

Automatic Pressure Compensator

The Foxboro flowmeter, manufactured by the Foxboro Co., Foxboro, Mass., now incorporates an automatic pressure compensator. In measuring the flows of compressible fluids, such as steam, air, and gas,

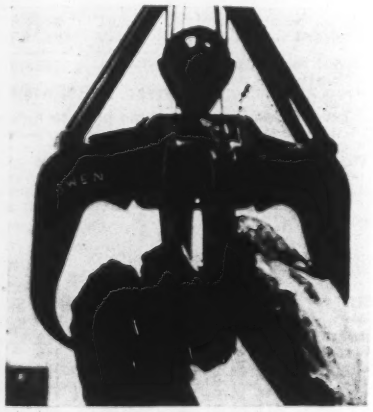


variation in the static pressure of the fluid directly influences the reading. The Foxboro compensator is claimed to prevent errors of this sort.

The mechanism is shown in the illustration. It is merely a simple spiral pressure tube connected to a lever. As the line pressure changes, the spiral adjusts the multiplication of the linkage between the float and pen arm. This is a percentage rather than an additive correction; the linear amount of correction differs at different points of the chart, and is calibrated to fit the flow formula of the meter. The compensator is said to correct the position of the flow pen for a change in pressure as small as one-tenth of one per cent.

New Four Tine Grapple

The Owen type RA grapple, manufactured by the Owen Bucket Co. of Cleveland, is a four tine grapple with independent action on each tine. Instead of all the tines moving together, toward the center, in closing, any tine is capable of acting independently of the other three. This action, the manufacturer claims, gives a more positive grip on the stone, since all four tines are exerting pressure.



CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Los Angeles — Petroleum Terminals, Ltd., Berths 163 and 164, San Pedro, application approved by Harbor Dpt. to make improvements to Berths 163 and 164, incl. installation 12 in. oil line, 2 in. air line, and 6 in. water line, $2,350; 3 in. water line and 2 in. steam line, $510; 8 in. lighting standards and 1 hose derrick, $500. A. E. Eldridge, genl. mgr. Harbor Dpt., City Hall.

Mont., Helena—City plans enlarging pipe line from 10 mi. settling basin to city distribution system, $368,000.

Neb., Falls City—City, G. S. Lyons, mayor, plans election to vote bonds, constructing reservoir. $106,000. Allotment approved.

N. J., Newark—City made plans 8,000 ft. 20 in. c.i. watermains covered with mortar as protection against acid condition of soil in Doremus Ave. $122,000. Mr. Banks, City Hall, ch. engr. Water Dpt.

N. C., Blowing Rock — Town filed application with P.W.A. for loan and grant for water and sewerage systems. Est. $43,636. D. P. Coffey, mayor.

★**S. C., Charleston**—Comrs. Public Works, plans extending water tunnel 18½ mi. from Edisto River to Goose Creek, to be about 7 ft. high, modified horseshoe shape, to be dug through marl stratum underlying this section, and will deliver 70 m.g.d. of which 15 to 25 m.g. are to be used by West Virginia Pulp & Paper Co., for proposed new plant at Port Terminals. J. E. Gibson, supt. and engr. for city, 8 George St. Est. $905,000. City will issue $1,000,000 bonds. Malcom Pirnie, 25 West 43rd St., New York, is engr. for West Virginia Pulp & Paper Co. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

BIDS ASKED

★**Massachusetts**—July 2, by Commonwealth of Massachusetts, Metropolitan Dist. Comn., Water Supply Div., R. N. Molt, secy., 20 Somerset St., Boston, constructing Quabbin Reservoir main dam, Belchertown, Enfield and Ware, embankment and spillway of Quabbin Reservoir main dam, the embankment will be 2,640 ft. long, 170 ft. maximum height, requiring 4,000,000 cu.yd. and must be constructed by fill hydraulic methods. A concrete caisson, cut-off has been constructed to ledge across the valley bottom. The work in this project includes placing concrete over and grouting ledge rock on the 2 hillsides; placing rip rap on the upstream and soil dressing on the downstream faces; constructing intakes at different levels; intake shaft foundations of outlet works; spillway channel involving earth excavation and over 100,000 cu.yd. rock excavation; masonry spillway weir, 400 ft. long and 5 to 15 ft. high and masonry arch bridge of about 40 ft. span; building roads and other appurtenant works. Total cost of this part of project probably exceeds $1,500,000. F. E. Winsor, 20 Somerset St., Boston, ch. engr.

Neb., Lincoln—June 23, by State Bd. Control, O. R. Shatto, secy., Capitol Bldg., furnishing, installing pumping unit at Lincoln State Hospital.

N. J., Greystone Park—June 24, by C. N. Leathem, state archt., automatic chlorinator for water supply at state hospital. $2,500.

N. J., Newark—See "Contracts Awarded."

N. Y., Lake Placid—See "Contracts Awarded."

Tex., Dawson — City, c/o W. R. Johnson, Mayor, taking new bids waterworks extension, incl. earthwork on dam, pumphouse, new pumps, supply mains, fire hydrants, meters, etc. $68,000. P.W.A. project. Bids Nov. 19 rejected. A. F. Mitchell, Corsicana, engr.

Ont., Ottawa—June 25, by Secretary Bd. Control, constructing new 48-in. auxiliary pipe line for city's water, and pier from Lemieux Island to mainland to be awarded in 7 tenders as follows: Contr. 1, general contract. Contr. 2, steel pipe carrying structure, steel pipe bents and shells. Contr. 3, steel cylinder concrete pipe and specials. Contr. 4, special pipe castings and bolts. Contr. 5, gate valves. Contr. 6, venturi meter. Contr. 7, 48 in. c.i. pipe. $135,000. W. W. MacDonald, Ottawa, engr.

CONTRACTS AWARDED

†**Arizona**—U. S. Indian Irrigation Service, 751 South Figueroa St., Los Angeles, sinking, completing and testing three to five 20 or 24 in. water wells on Colorado River Indian Reservation, to Roscoe Moss Co., 4360 Worth St., Los Angeles, Calif. Bids June 2, awarded June 3.

Ark., Bentonville—City, rehabilitation and improving waterworks, to L. M. Clutter, Inc., Springfield, Mo., $38,763. Est. $43,000. Subject to P.W.A. approval. Noted May 1, C.D. —May 7, E.N.-R.

Calif., Los Angeles—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., constructing concrete fence, paving, etc., for sanitation at Hollywood Reservoir, to Loverich & Konjevod, 5303 North Hartwick St., $69,619. Bids May 21, awarded June 4. Noted June 1, C.D.

Calif., Los Angeles — D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., constructing Ivanhoe Reservoir outlet tunnel and appurtenant structures, 1,447 lin.ft. tunnel, 6 ft. I-D, excavated and lined with concrete, Spec. X-25, to Mike Radich & C. T. Brown, 410 North Formosa St., $75,881. Bids May 27, awarded June 9. Noted June 4, C. D.

Ga., Roswell—City, Contr. 4, waterworks, to Burford, Hall & Smith, 140 Edgewood Ave. N.E., Atlanta, $10,446; Contr. 3, to Vaughan Constr. Co., Roswell, $12,940. **P.W.A.**

Mass., Athol — Town, Bd. Water Comrs., Memorial Bldg., mechanical filtration plant and equipment, to Way & Di Cicco Constr. Co., 74 High St., Stoneham, $46,500. **P.W.A.** Bids May 15, awarded June 4. Noted May 20, C.D. —May 7, E.N.-R.

N. J., Newark—City, constructing 2,000 ft. 20 in. Class E c.i. high pressure pipe line on Broad St. between Parkhurst and Pioneer Sts., relief labor under Mr. Banks, ch. engr. Water Dpt., $45,000. Half of pipe will be purchased by City, other half by Procurement Division, W.P.A., 1060 Broad St.

N. J., Ocean Gate—Boro, constructing waterworks, power generating equipment, to Shaw Electric Co., 101 Central Ave., Newark, $3,740. **P.W.A.** Noted Dec. 18, C. D.—Dec. 28, E. N.-R.

N. Y., Buffalo—Western New York Water Co., 11 Niagara St., booster pumping station, to G. W. Walker, 770 Elmwood Ave., Buffalo. Private plans.

N. Y., Goshen—Village, venturi meter and filter bed equipment, to Roberts Filter Mfg. Co., Darby, Pa. **P.W.A.** Bids Mar. 19. Noted Mar. 10, C.D.—Mar. 12, E.N.-R.

N. Y., Lake Placid — Village, constructing temporary timber dam on south side of village, by relief labor, $25,000. **W.P.A.** H. W. Taylor, 9 Park Pl., New York, engr. Investigation and studies for larger project being made. **Maturity indefinite.** Noted June 10, 1935, C. D.

N. Y., New York—Bd. Water Supply, 346 Bway., New York, making test borings in towns of Gardiner, Plattekill and Marlboro. Contr. 331, to Pennsylvania Drilling Co., 1201 Chartiers Ave., Pittsburgh, Pa., $42,850. Bids May 26. Noted May 27, C.D.—May 14, E.N.-R.

O., Doylestown—Village, waterworks system. Contr. A, distribution system, and Contr. C, pump building and iron removal plant, to B. F. Perry, 106 North Main St., Akron, $48,508 and $10,605 respectively***Contr. B, elevated tank, to Chicago Bridge & Iron Wks., Rockefeller Bldg., Cleveland, $8,731. **P.W.A.** Noted Apr. 8, C. D.—Apr. 16, E. N.-R.

Wash., Tacoma—City, 45 ft. 6 in. c.i. waterworks connection at South 19th and M Sts. $2,937. Work done by Dpt. W. A. Kunigk, City Hall, engr.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Calif., Eureka—City, election June 22, $40,000 bonds, to finance construction sewerage system in Washington St., from Broadway to Government Bulkhead. City will apply for 45% grant (P.W.A.) if bonds are voted. Noted Nov. 14, C.D.—Nov. 21, E.N.-R.

★**Fla., Miami Beach**—Municipality, preliminary surveys sewers. Ultimate cost $1,000,000. M. Pirnie, 25 West 43rd St., New York, engrs.

Minn., Fairmont—City, rejected bids May 21, furnishing, laying 7,675 lin.ft. sanitary sewer and 7 manholes. L. H. Coult, city clk.

★**N. Y., Jamaica**—Dpt. Sanitation, 125 Worth St., New York, plans incinerator at Liberty Ave. $800,000. **Maturity after Jan. 1.**

N. C., Blowing Rock—See "Waterworks."

O., Bethesda—Village plans sewage disposal plant, sewer lines, watermains, imhoff tanks, screen building, sludge tanks, filter beds. W.P.A. project. R. P. MacDowell, Chester-Twelfth Bldg., Cleveland, engr.

Utah, Payson—City defeated bonds, constructing sewerage system. $32,000. Engineer not appointed. Noted Mar. 19, C. D.—Mar. 26, E. N.-R.

Ont., Kingston—H. S. Dick, city engr., soon takes bids installing sewers in Division, Arch, Union and Princess Sts. and General Hospital grounds, for City. $27,341.

BIDS ASKED

Ill., Chicago—June 25, by Sanitary Dist. of Chicago, 910 South Michigan Ave., furnishing, constructing pump discharge chamber and tubes, plant outfall and outfall structure, control structures and miscellaneous conduits, excavation, etc., for Southwest Sewage Treatment Works Div. R, South 52nd Ave., south of West Pershing Rd., Stickney Twp., J. J. Sullivan, clk.

Ill., Chicago—June 30, by Sanitary Dist., 910 South Michigan Ave., constructing Div. A, Chicago River Controlling Works, incl. marine work, coffer dams, steel sheet piling, fill, concrete, structural steel, sector gates and operating machinery, in Chicago Harbor in Lake Michigan and east of Outer Drive Bridge now under construction. J. J. Sullivan, clk.

Md., Ocean City—June 26, by Mayor and City Council, sewage treatment plant. Clarke Gardner, Salisbury, engr.; adv. E. N.-R. June 18. P.W.A. Noted May 7, C.D.—May 14, E.N.-R.

Mass., Quincy—See "Contracts Awarded."

Mich., Detroit—June 26, by Dpt. P. Wks., Sects. 11 and 12, Detroit River Interceptor Sewer. Part of $22,000,000 P.W.A. sewage disposal plant. Jos. S. Stringham, City Hall, engr. Noted June 1, C.D.—June 4, E.N.-R.

N. Y., New York—June 23, by J. J. Lyons, pres., Bronx Boro. Bronx County Bldg., 161st St. and Grand Concourse, sewers in Lamport Pl., White Plains Rd., Givan, Tillotson, Barker and Adee Aves.

★**N. Y., New York**—July 9, by Sanitation Dpt., W. F. Carey, comr., 125 Worth St., constructing substructure and superstructure administration building, oil storage building, superstructure pump and blower house, brick chimney, heating plant, superstructures 4 preliminary sludge pumping stations, 2 return sludge pumping stations, 4 wings for operating gallery, 2 steel flagpoles with bases, settings outside stairs, superstructure sludge storage building, sludge and grease storage tanks, electric elevators, electrical and hand operated traveling cranes; transformer transfer cars and rail system, setting diffuser plates Contr. J; heating and ventilaiton work for administration building, pump and blower house, heating plant, 4 preliminary sludge and 2 return sludge pumping stations; 4 wings, sludge and oil storage buildings; Contr. K; plumbing work for same Contr. L, all for Wards Island Sewage Treatment Works. $2,176,000. P.W.A. and W.P.A. project.

N. Y., Rye—June 26, by Westchester Co. Sanitary Sewer Comn., County Office Bldg., White Plains, constructing and completing Sect. K-1 of Blind Brook Project, incl. 3,500 ft 18 and 24 in. enameled c.i. sewer, $97,481. P.W.A. project. W. W. Young, 148-166 Martine Ave., White Plains, consult. engr.; adv. E. N.-R. June 18.

N. C., Battleboro—See "Waterworks."

Wis., Neenah and Menasha — June 25, by Sewerage Comn., constructing intercepting sewers, Contr. 1, P.W.A. project. Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs.

LOW BIDDERS

★**Colo., Denver**—City, June 10, sewerage disposal plant, incl. 2 story administration building, 3 story chemical building, 4 clarifier basins, 4 digestive basins and rectangular filter system, all buildings will be of concrete, and especially processed tile to make plant entirely odorless, from Peter Kiewit Sons Co., 1024 Omaha Natl. Bank Bldg., Omaha, Neb., Bid A, $1,156,192; alternate Bid B, $1,149,792. Noted May 18, C. D.—May 21 E. N.-R.

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Sewerage, etc. (Continued)

CONTRACTS AWARDED

★**Calif., San Francisco**—State Supreme Court validates sales of bonds of $391,000 of 1928 sewer bond issue to finance extension of Alemany Sewer. Healy-Tibbitts Constr. Co., 64 Pine St. awarded contract at $334,259 but working was delayed pending Supreme Court decision. Total cost of work is estimated at $700,000. Above contract comprises first unit. Noted Jan. 2, C.D.—Jan. 9, E.N.-R., under "Contracts Awarded."

Conn., Hartford—Metropolitan Dist., Bureau P. Wks., Contr. A, constructing 3,200 ft. 21 and 30 in. sanitary sewers, incl. 1,500 cu.yd. rock excavating in Victoria Rd., to Charles Andreassi & Co., 8 Gartland St., Jamaica Plains, Mass., $45,743. Total est. $147,000. **P.W.A.** Bids Apr. 21, awarded June 1. Bids formerly thrown out when performance bond was not included. A special letter containing bond was later received and the low bid given preference. Noted May 21, C.D.—May 28, E.N.-R., under "Contracts Awarded."

Kan., Coffeyville—City, constructing sewage treating plant, to W. F. Edgell & Son, Leavenworth. Est. $128,000. **P.W.A.** Bids Apr. 21. Noted Apr. 15, C.D.—Jan. 30, E.N.-R.

Mass., Barnstable — Comrs. Barnstable Co., Court House, constructing settling and sludge tank and 8 in. clay sewer in connection with sewerage treatment plant now under construction, to W. A. Jones, Barnstable, $5,138. **P.W.A.** Bids May 29, awarded June 2. Noted May 21, C.D.

Mass., Quincy—City, E. Sargent, comr., City Hall, concrete and vitr. clay sewers in various streets, day labor. Est. $50,000.

O., Cleveland—City, constructing 2,085 ft. 24- to 36-in. D.S.P. sewer line encased in concrete in Walford Ave., to Domenic Nero Constr. Co., Guarantee Title Bldg., $52,666. R. Hoffmann, City Hall, engr. Noted Apr. 29, C.D.—May 7, E.N.-R.

O., Wilmington—Constructing sanitary sewer, Contr. 2, to Meier & Bolan, Cincinnati, $110,506. **P.W.A.** Noted May 7, C.D.—May 14.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

★**Ill., East St. Louis**—Bd. Supervs. St. Clair Co., Court House, Belleville, bids in July, constructing 3 span rein.-con., steel bridge over Mississippi River between Stites Twp., St. Clair Co., Ill., and point near Cass Ave., St. Louis, Mo., $4,231,123. P.W.A. project. B. C. McCurdy, Belleville, supt. Noted Sept. 9, C.D.—Sept. 12, E.N.-R.

Iowa—State Hy. Comn., Ames, soon takes bids constructing 143x24 ft. multiple span I-beam overhead bridge, 1 rein.-con. arch and 1 rein.-con. pipe culverts on secondary road, Sect. 12, Elkhorn Twp., Fort D. D. M. & S. R.R., Webster Co., incl. 130 cu.yd. Class 1 excav.; 374x20 ft. continuous I-beam bridge, 1 rein.-con. box and 1 rein.-con. pipe culverts on secondary road north of Correctionville, Woodbury Co., 345 cu.yd. Class 1 and 570 cu.yd. Class 2 excav., 125 cu.yd. backfill; 10 corrugated metal pipe, 10 rein.-con. pipe and 5 rein.-con. box culverts and extensions on secondary road from Udell West and South to Primary Rd. 3, Appanoose Co., 477 cu.yd. Class 1 excav.; 6 rein.-con. box culverts and extensions, 4 rein.-con. pipe culverts and 1 corrugated metal pipe culvert on secondary road in and north of Eddyville, Wapello and Mahaska Counties, 232 cu.yd. Class 1 excav.; 210x24 ft. continuous I-beam overhead bridge and 1 creosoted laminated woodbox culvert on secondary road over C. G. W. R.R. at Bentley, Pottawattamie Co., 460 cu.yd. Class 1 excav.; multiple span I-beam bridge consisting of seven 72x20 ft. I-beam spans on secondary road in Green Bay and Washington Twps., Lee Co., 260 cu.yd. Class 1 excav.; 4 corrugated metal pipe culverts, 2 rein.-con. pipe culverts and 2 rein.-con. box culverts and extensions on secondary road, Adair Co., 85 cu.yd. Class 1 excav.; two 150x24 ft. high truss spans with four 40x24 ft. I-beam approach spans on secondary road west of Coppock over Skunk River, Henry, Jefferson and Washington Counties, 349 cu.yd. Class 1 and 630 cu.yd. Class 2 excav. F. R. White, Ames, ch. engr.

Iowa—State Hy. Comn., Ames, soon takes bids 22 laminated wood box culverts and 4 rein.-con. culverts and extensions on secondary road south of Moulton, Appanoose Co.; 190x24 ft. continuous I-beam bridge on secondary road southwest of Nodaway, at C. B & Q. R.R., Adams Co.; 5 rein.-con. pipe culverts 150x24 ft. continuous I-beam overhead on Primary Rd. 261, Martelle, Jones Co.; 5 laminated wood box culverts, 4 corrugated metal pipe culverts on secondary road, south of Moulton at Wabash Ry., Appanoose Co.; one I-beam undergrade crossing, 2 rein.-con pipe and 1 rein.-con box culverts on secondary road, between Sect. 17 and 18, Davenport Twp., Scott Co. F. R. White, ch. engr.

Iowa—State Hy. Comn., Ames, making plans constructing 292x20 ft. continuous I-beam bridge on secondary road in Sect. 31, Canoe Twp., northwest of Decorah, Winneshiek Co., incl. 100 cu.yd. Class 1 and 250 cu.yd. Class 2 excav.; 27 ft. I-beam undergrade crossing structure, 1 rein.-con. box culvert on secondary road on west corporation line of Nevada at C. & N.W. Ry. crossing, Story Co., 405 cu.yd. Class 1 excav.; 6 corrugated metal and 9 rein.-con. pipe culverts; and 1 rein.-con. box culvert on secondary road in Bluffton and Canoe Twps., northwest of Decorah, Winneshiek Co., 218 cu.yd. Class 1 excav.; 2 corrugated metal pipe, 11 rein.-con. pipe and 5 rein.-con. box culverts and extensions on secondary road in Davenport and Sheridan Twps., northwest of Davenport, Scott Co.; one 136x24 ft. I-beam overhead on Primary Rd. 14, north of Greene at C.R.I. & P. Ry., Butler Co. F. R. White, ch. engr.

Iowa—State Hy. Comn., Ames, soon takes bids constructing 792x24 ft. multiple span I-beam overhead crossing structure and one 6x4 ft. and 585.6 ft. rein.-con. box culvert, incl. 10,566 cu.yd. Class 1 excav. and 150x24 ft. continuous I-beam bridge, 80 cu.yd. Class 1, 170 cu.yd. Class 2 and 1,400 cu.yd. channel excav., on Primary Rd. 59, in Emerson, Mills Co., 207 ft. undergrade crossing structure on U. S. Rd. 6, at C.R. & I. & P. Ry. crossing, Newton, Jasper Co., 1,250 cu.yd. Class 1 excav.; 3 rein.-con. pipe and 1 rein.-con. box culverts and one 28 ft. deck girder underpass structure on secondary road southwest of Mystic at C.M. St. & P. R.R. crossing, Appanoose Co. F. R. White, ch. engr.

★**Iowa**—State Hy. Comn., Ames, soon takes bids 1,401 ft. deck girder bridge, 42 ft. roadway and two 5 ft. sidewalks on U. S. Rds. 65 and 69 over D.M. Ry., C.B. & Q. R.R., C.G.W. R.R., Iowa Transfer Ry., C.R.I. & P. Ry., D.M.U. Ry., and D.M.W. Ry., in city of Des Moines, Polk Co., incl. 4,154 cu.yd. Class 1 excav.; 750 ft. deck plate girder bridge, incl. two 105 ft. and four 135 ft. spans on relocation of U. S. Roads 65 and 69, Des Moines, Polk Co. Est. about $500,000. F. R. White, ch. engr.

Missouri — State Hy. Comn., Jefferson City, soon takes bids constructing one 90 ft. steel plate girder bridge over Little Pomme de Terre River and two 10 ft. rein.-con. slab spans over Lawler Branch, on Warsaw Fairfield Rd., Bolton Co.; one 16 ft. rein.-con. slab span over stream, two 10 ft. rein.-con. slab spans over Baker Branch and three 10 ft. concrete slab spans over Walker Branch, all on Route 21-Northeast, Reynolds Co.; two 10 ft. rein.-con. slab spans and three 29 ft. I-beam spans over South Fork of Claybank Creek, on Bevier to College Mount, Macon Co.; one 90 ft. steel plate girder span over Cedar Creek, and one 80 ft. steel deck plate girder span over Horse Creek on Jericho Springs-Route 64 Rd., Cedar Co.; three 50 ft. I-beam spans over Shoal Creek and two 30 ft. and three 35 ft. I-beam spans over Thornton Mill Creek, Clay Co.; two 10 ft. rein.-con. slab spans over east fork of Collier Creek, on Alba North, Jasper Co.; three 30 ft. rein.-con. deck girder spans, concrete substructure over Elk Creek, Elk Creek to Tyrone Rd., Texas Co.; one 120 ft. steel truss span over Wyaconda River, Route 15 West, Scotland Co.; three 16 ft. rein.-con. slab span bridge over stream, Louisiana-St. Louis Rd., Pike Co.; three 30 ft. I-beam spans over Lost Creek, St. Joseph-Atchison Rd., Buchanan Co.; one 20x16 ft. arch culvert over stream, in Kansas City, Jackson Co.; one 90 ft. steel deck plate girder bridge, concrete floor, over Lick Creek, on Perry-Route 24 Rd., Ralls Co.; one 225 ft. central bridge, over Gasconade River, on Richland-Route 66 Rd., Pulaski Co.; one 225 ft. central span and two 112 ft. side suspension bridge over Current River, Eminence East, Shannon Co.

N. Y., Union—Bd. Village Trustees, Village Hall, plans reconstructing bridges on Saw Mill River Rd., Central and Woodrow Aves., and on road between Johnson City and Endicott and Choconut Creek Bridge to replace bridges damaged by flood.

Ohio—See "Streets and Roads, under Bids Asked."

★**B. C., Vancouver**—British Pacific Properties Ltd., 675 West Hastings St., plans and takes bids late this fall for 5,550 ft. 3 spans and approaches suspension bridge with concrete caissons, entrance to Vancouver Harbor, $6,000,000. Monsarrat & Pratley, Drummond Bldg., designing and supervising engrs. Robinson & Steinman, 117 Liberty St., New York, consult. engrs. (**Correction**—Engineers.) Noted June 8, C. D.—June 11, E. N.-R.

BIDS ASKED

Connecticut—See "Streets and Roads."

Indiana—June 23, by State Hy. Comn., Indianapolis, constructing 36 ft. rein.-con. arch bridge, 180 ft. continuous steel beam bridge, 32 ft. rein.-con. girder bridge, over Souders and Muddy Creeks, and Mill Branch, near Borden, Clark Co.; 48 ft. encased I-beam bridge, also 0.19 mi. grading, paving under Pennsylvania and Wabash R.R., Fort Wayne, Allen Co.; 576 ft. rein.-con. arch bridge over White River and Killbuck Creek, Bway., Anderson, Madison Co.; 60 ft. rein.-con. bridge over Bell Creek, 4 mi. northeast of Daleville; and 36 ft. rein.-con. arch bridge over No Name Creek, 4 mi. southeast of Muncie, Delaware Co.; 36 ft. rein.-con. bridge over Grassy Creek, 2.5 mi. north of U. S. Rd. 30, and 50 ft. rein.-con. bridge over Tippecanoe River, south of North Webster, Kosciusko Co.; 56 ft. steel girder grade crossing elimination project under E.J. & E. Ry., on Industrial Hy., Gary, Lake Co.; 63 ft. steel girder bridge over

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†*Federal Government*

Bridges, etc. (Continued)

New York Central and St. Louis Ry., west of Noblesville, Hamilton Co.; 49 ft. steel beam bridge under New York Central & St. Louis and C.C.C. and St. L. Rys., Madison St., Muncie, Delaware Co.; new abutments and re-erecting steel truss bridge over Patoka River Overflow, near Pikesville; reconstructing 22 ft. steel beam bridge over Backwater Creek, Rural Dist. south of State Rd. 56 and 140 ft. steel beam bridge on creosoted wood piling over Flat Creek, Rural Dist. south of State Rd. 56; rein.-con. girder bridge over Pigeon Creek, south of Princeton, all foregoing Pike Co. M. R. Keefe, ch. engr.

Indiana—June 23, by State Hy. Comn., Indianapolis, constructing 180 ft. rein.-con. steel beam bridge over Big Indian Creek and 30 ft. rein.-con. arch span bridge over Crandall Branch Ditch, southwest of Crandall, Harrison Co. J. A. Adams, comr.

Maryland—June 23, by State Road Comn., Baltimore, constructing one steel girder bridge 92 ft., one 93 ft., one 103 ft., one 106 ft. and one 139 ft. with concrete floor, and two 3 ft. sidewalks concrete substructure over tracks Penna. R.R. on Baltimore-Washington Rd., Baltimore.

Massachusetts—June 23, by Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, grade crossing, steel stringer bridge with rein.-con. approach spans over B. and M. R.R., Leominster St., Lunenburg, involving 62 tons Class "I" bituminous concrete surface on bridge and 60 tons on sidewalks, about 7,035 sq.yd. either bituminous macadam on penolithic type surfacing on approach spans. $75,000. G. H. Delano, ch. engr.

Massachusetts—See "Streets and Roads."

†**Miss., Vicksburg**—July 2, by Pub. Rds., Dpt. Agriculture, at office Park Superintendent, Vicksburg, constructing brick faced, rein.-con. bridge over Hall's Ferry Rd. Project 102, Vicksburg Natl. Military Park, incl. 1,130 cu.yd. structural excav. H. J. Spelman, Bureau P. Rds., 1725 F St. N.W., Wash., D. C., dist. engr.

New Jersey—June 22, by State Hy. Dpt., Trenton, eliminating of Lake Ave. and L. V. R.R. grade crossing at Goodman's in Scotch Plains and Clark Twps., Union Co., incl. 3,826 cu.yd. roadway excav., 65,272 cu.yd. borrow, etc.

New Jersey—June 22, by State Hy. Dpt., Trenton, constructing grade crossing elimination, Route 25, Sect. 22, over tracks Pennsylvania R.R. at Hightstown, Mercer Co., incl. 1,525 cu.yd. foundation excav. Noted Mar. 6, C.D. —Mar. 12, E.N.-R.

New York—June 30, by Triborough Bridge Authority, 111 8th Ave., New York, constructing esplanade and landscaping Grand Central Parkway extension for Queens connection of Triborough Bridge, connecting Manhattan, Queens and Bronx Boros, Contr. 73; adv. E.N.-R., June 18.

New York—June 30, by Dpt. P. Wks., Albany, constructing 105 ft. truss bridge, macadam paving 0.07 mi. road in Washington Co.; 100 ft. girder bridge over N. Y. O. & W. R.R., and concrete paving in Orange Co.; and 42 ft. I-beam bridge and concrete paving 0.97 mi. road in Steuben Co. F. S. Greene, supt.; adv. E.N.-R., June 18.

★**N. Y., Brooklyn**—June 24, by Marine Parkway Authority, Arsenal Bldg., Central Park, New York, constructing substructure, Contr. 5, Parts 1 and 2, concrete substructure to lift spans; superstructure, Contr. 6, Part 1, 2 thru spans and towers, Part 2, North and South Deck spans for bridge across Rockaway Inlet, from Marine Park, Brooklyn Boro, to Jacob Riis Park, Queens Boro. $6,000,000 bonds sold. Madigan & Hyland, 521 5th Ave., New York, consult. engrs. Noted May 27, C. D.— June 4, E. N.-R., under "Contracts Awarded."

Pennsylvania—See "Streets and Roads."

LOW BIDDERS

★**Tex., Port Arthur**—State Hy. Comn., Austin, June 10, Contr. 2, superstructure Neches River Bridge, over Neches River, Hy. 87, P.W.A. Docket Texas 8080-R, between Beaumont and Port Arthur, Jefferson Co., from Taylor-Fichter Steel Constr. Co., 570 7th Ave., New York, $1,593,500. Est. $1,350,000. Total est. about $2,500,000. New P.W.A. project. Noted May 14, C. D.—May 21, E. N.-R.

CONTRACTS AWARDED

Ariz., Wickenburg—State Hy. Comn., Phoenix, rein.-con., steel underpass and approaches on U. S. Hy. 60, here, to Phoenix Tempe Stone Co., 13th Ave., Buchanan St., Phoenix, **$83,614.** Bids May 22. Noted May 27, C. D.—June 4, E. N.-R.

California—C. H. Purcell, ch. hy. engr., 808 State Bldg., Los Angeles, constructing overhead crossing over tracks of Atchison, Topeka & Santa Fe Ry., at Palm Ave., 3 mi. south of Colton, and grading, plant-mixed surfacing approaches, San Bernardino Co., to J. Oberg, 3470 East 8th St., Los Angeles, **$20,736***** undergrade crossing under tracks of Atchison, Topeka & Santa Fe R.R., Rivera on San Gabriel Blvd., Los Angeles Co., to J. E. Haddock, 357 North Chester Ave., Pasadena, **$98,672*****rein.-con. girder bridge consisting of nine 67 ft. spans and two 26 ft. spans over Rio Hondo, 2 mi. west of El Monte, Los Angeles Co., to O. Obert, 150 North Vista St., Los Angeles, **$117,-880.** Grand total $247,288. Bids May 28. Noted June 1 and June 5, C. D.

California—State Hy. Comn., Sacramento, constructing rein.-con. bridge and 1.5 mi. hy. between 4 mi. north of Willows and 1 mi. south of Artois, Glenn Co., etc., to N. M. Ball, P. O. Box 404, Berkeley, **$43,672.** Bids May 13. Noted May 22, C. D.—Apr. 30, E. N.-R.

Indiana—State Hy. Dpt., Indianapolis, constructing road in Lake Co., to E. Stroni & Co., Gary, **$197,000.** Est. $205,360. Bids Apr. 28, awarded June 6. Noted May 4, C.D.—Apr. 23, E.N.-R.

Indiana—State Hy. Comn., Indianapolis, constructing 100 ft. I-beam steel bridge on creosoted wood piling over Mud Creek, Rush Co., to J. R. Gates, 1214 Anthony Ave., Fort Wayne, **$16,285.** Est. $18,228. Bids Apr. 7. Noted Apr. 13, C. D.—Mar. 26, E. N.-R.

Ia., Charles City—Floyd and Mitchell Counties, G. O. Mitchell, aud., 350x20 ft. deck plate girder bridge, over Red Cedar River, Sect. 24, Floyd Twp. to C. Holvik, Mason City, **$35,625.** Bids June 2. Noted May 27, C.D.—May 14, E.N.-R.

Ia., Waverly—Bremer Co., H. J. Stumme, aud., constructing 1 concrete box and 2 concrete pipe culverts, four 32x20 ft. I-beam spans, one 292x20 ft. continuous I-beam and two 20x20 ft. I-beam bridges, to Waugh & Tackman, Clarksville, **$37,447.** Bids June 3.

Kansas—State Hy. Comn. at office County Clerk, Ashland, (**P. means Project**), to E. H. Krehbiel, Kansas City, Mo., Bridge 6.4, 64 ft., 80 ft., 80 ft., 65 ft., continuous I-beam span, P. 160-13-FA 461 A, **$29,125*****to O. O. Fuller, Nevada, Mo., Bridge 5.1, 2 units 40 ft., 48 ft., 40 ft., continuous I-beam span, P. 160-13-FA 461 A, **$20,781*****to Bert Anderson & Sons, Soldier, Bridge 5.6, three 8x5x32 ft., rein.-con. beam span P. 160-13-FA 461 A, **$2,054;** Bridge 11.2, three 6x6x30 ft., rein.-con. beam span P. 160-13-FA 461 A, **$2,339;** Bridge 8.8, 40 ft. span, barrel arch, P. 160-13-FA 461 A, **$14,658;** all foregoing in Clark Co.; Bridge 2.9, five 8x5x32 ft., rein.-con. beam span, P. 27-4-FA 358, H. **$3,253;** Bridge 5.7, four 8x5x32 ft., rein.-con. beam span, P. 27-4-FA 358 H, **$2,701,** foregoing in Stanton Co.; Bridge 6.5, 9 8x7x32 ft., rein.-con. beam spans, P. 23-9-FA 464 D, Part 1, Lane Co., **$5,437.** Grand total $81,348. Noted May 19, C. D.—May 21, E. N.-R., under "Streets and Roads."

Kansas—State Hy. Comn., at office County Clerk (**P. means Project**), Phillipsburg, raising and widening 30 ft. I-beam span Bridge 14.7, P. 1-21-FA 210-B, Philips Co., and Bridge 7.7, 65-80-65 ft., continuous I-beam span, P. 281-1-FA 528-A, Smith Co., to C. Beardsley, Lawrence, **$1,745** and **$23,668** respectively*** Bridge 18.4, 45-55-45 ft. continuous I-beam span, P. 1-21-FA 210-C, Philips Co., to Schlichter Constr. Co., Clay Center, **$14,382.** Grand total $39,795. Bids June 4. Noted May 19, C. D.—May 21, E. N.-R., under "Streets and Roads."

Maryland—State Roads Comn., Baltimore, grade elimination, triple 36 ft. 9 in. span, steel girder bridge encased in concrete with concrete floor, substructure, etc., over tracks of B. and O. R.R., Contr. M-77-4-39, Federal Aid Project NRM 340-B, Montgomery Co., to Jarboe & Haughton, Mechanicsville, **$27,570.** Bids Apr. 21. Noted Apr. 15, C. D.

Md., Baltimore—Western Maryland Railway Co., G. R. Haworth, engr. maintenance of way, replacing bridge on an interchange track at west end of Cumberland, recently washed out during flood, consisting of two spans, one 90 ft. and other 94 ft. 8 in. spans, Cooper's E-72 loading erected on present masonry, to American Bridge Co., 71 Bway., New York.

Neb., Columbus—Secretary Loup River Public Power Dist., 2307 13th St., Columbus, constructing Burlington R.R. Bridge at Station 1883 plus 92, incl. steel bridge with concrete center pier and timber trestle approaches to support tracks across tailrace canal and removing railroad plug, to Peter Kiewit Sons Co., and G. W. Condon Co., Grain Exchange Bldg., Omaha, Neb., **$18,395. P.W.A.** Bids Apr. 21. Noted Apr. 2, C. D.—Apr. 9, E. N.-R.

Neb., Hastings — City Council constructing viaduct, to Koehler Constr. Co., Lincoln, $102,000. Noted May 8, C.D.—May 14, E.N.-R.

Nevada—See "Streets and Roads."

★**New York**—A. W. Brandt, comr. Hys., Albany, bridges in Washington Co., to Spellman-Oliver Co., Chateaugay, **$69,362** est. $82,-860***Cortland Co., to C. D. Murray Co., Inc., 701 Westcott St., Syracuse, **$120,643** est. $142,-546***Onondaga Co., to Walsh Constr. Co., Herald Bldg., Syracuse, **$388,944** est. $416,236 ***Broome Co., to Richard Hopkins Co., P. O. Box 1025, Albany, **$104,786** est. $118,242. Grand total $683,735. Bids May 26. Noted May 29, C. D.—May 14, E. N.-R.

New York—Dpt. P. Wks., Albany, constructing bridge on Richford-Harford Mills Rd., Tioga Co., to H. M. Strong & Son, Whitney Point, **$28,962.** Est. $36,453. Bids May 5. Noted May 7, C.D.—May 28, E.N.-R.

New York—M. R. Ingraham, Inc., general contractors, 444 Bway., Albany, reinforcing steel for bridge on Hy. 708, Delaware Co., for Dpt. P. Wks., Albany, to Albany Steel & Iron Supply Co., Troy Rd., Albany; structural steel, to American Bridge Co., 71 Bway., New York. Noted June 4, C.D.—June 11, E.N.-R., under "Contracts Awarded."

†*Federal Government*

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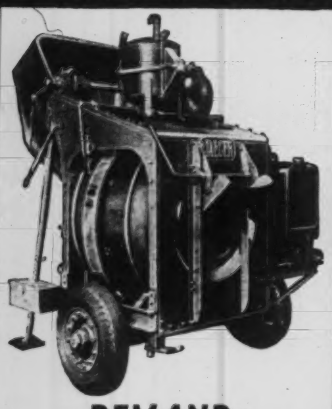

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Bridges, etc. (Continued)

New York—Transit Comn., 270 Madison Ave., New York, reconstructing bridge carrying Walton Ave. over the tracks of Hudson-Electric Div. of New York Central R.R.; carrying East 179th St. over tracks of Harlem Electric Div. New York Central R.R.; carrying East 173rd St. over tracks of Harlem Electric Div. New York Central R.R.; carrying East 183rd St. over tracks of Harlem Electric Div.; carrying East 200th St. over tracks of Harlem Electric Div. with related structures, to H. H. Sherwin Co., Inc., 420 Lexington Ave., New York, $188,027. **P.W.A.** Bids May 29. Noted June 1, C.D.—May 14, E.N.-R.

N. Y., Binghamton—City, steel, concrete underpass near Ferry Street Bridge, to Walsh Constr. Co., Herald Bldg., Syracuse, **$127,402. P.W.A.** Bids May 19. Noted May 21, C.D.—May 7, E.N.-R.

N. Y., New York—Transit Comn., 270 Madison Ave., reconstructing bridge carrying River Avenue over tracks of Hudson Electric Div. of New York Central R.R., bridge carrying East 161st St. over Harlem Electric Div. same railroad, bridge carrying East 169th St. over same railroad, bridge carrying East 180th St. over same railroad, bridge carrying East 156th St. over Port Morris Branch of same railroad, bridge carrying Southern Blvd. over same railroad with all related structures, Bronx Boro, to Quinn Messner Co., 9815 Alystyne Ave., Corona, **$344,054.** Bids Apr. 1. Contract awarded in April. Noted Apr. 15. C.D.—Mar. 26, E.N.-R.

North Carolina—State Hy. and P. Wks. Comn., Raleigh, **(P. means Project)** overhead crossing Norfolk-Southern R.R. at McCullers, 0.34 mi. hy. P. 4885, Wake Co., and underpass and approaches, South Graham St., Charlotte, 0.14 mi. P. 6528, Mecklenburg Co., to F. A. Triplett, Chester, S. C., **$12,424** and **$62,957** respectively***overhead crossing, structures 0.02 mi. P. 6489, Mecklenburg Co., to Hobbs-Peabody Constr. Co., 317 West Worthington Ave., Charlotte, **$19,204*****overhead crossing, structures 0.02 mi. P. 7432, Forsyth Co., to Northeastern Constr. Co., Winston-Salem, **$10,441.** Grand total $105,026. Bids May 28. Rejected bids May 28, overhead crossing, structures 0.34 mi. hy. P. 4784, Wake Co. Noted June 4, C. D.

Ohio—J. J. Jaster, Jr., dir. State Hys., Columbus, constructing grade crossing elimination, incl. grading, drainage structures, concrete paving 0.182 mi. Fulton Co., to Freeman & Jones, Inc., 5716 Euclid Ave., Cleveland, **$85,933** est. $92,784; constructing grade crossing elimination, incl. grading, drainage, roadside improvement 0.298 mi. Portage Co., to W. M. Brode Co., 1st Natl. Bank Bldg., Newcomerstown, **$169,495** est. $193,277. Bids June 2. Noted May 21, C.D.—May 28, E.N.-R.

Ohio—J. J. Jaster, Jr., dir. State Hy. Dpt., Columbus, constructing Bridge MA-62-148 grade crossing elimination, with Erie R. R. Co., part Youngstown Sect., Youngstown Sharon Rd., State Hy. 331, U. S. Route 62, WPGM 524D, Mahoning Co., to Cable Co., 800 2nd St. S.E., Canton, **$207,691.** Est. $226,841.

Ohio—See "Streets and Roads."

Oklahoma—State Hy. Dpt., Oklahoma City, constructing 210 ft. I-beam bridge, on concrete piers at Elk City, Beckham Co., to Classen & Venable, Beaver, **$15,754** est. $5,867***1,220 ft. bridge at Ava, Woods Co., to T. C. Ottinger, Hinton, **$128,133** est. $146,905****44 ft. I-beam underpass at Calvin, Hughes Co., to List & Weatherly Co., Railway Exch. Bldg., Kansas City, Mo., **$21,258** est. $20,434***125 ft. bridge at Howe, LeFlore Co., to S. E. Gray, Muskogee, **$31,668** est. $39,900. Grand total $196,813. Bids June 2. Noted May 29, C.D.

Pennsylvania—At office W. Van Dyke, secy. Hys., Harrisburg, encased I-beam overpass bridge, rein.-con. paving, rein.-con. arch, bituminous on crushed aggregate surfacing 5.783 ft. R-148, Ephrata Twp., Ephrata Boro, Lancaster Co., to H. T. Campbell Sons, Towson, Md., **$135,203.** Bids May 8. Noted May 18, C.D., under "Bridges and Grade Crossings," and Apr. 30, E.N.-R., under "Streets and Roads."

South Carolina—See "Streets and Roads."

Tennessee—See "Streets and Roads."

Texas—G. Gilchrist, state hy. engr., Austin, constructing I. and G. N. R.R. underpass and approaches, on Hy. 2, WPGH 273-B, Frio Co., to Brown & Root, Inc., 708 Colorado St., Austin, **$84,144.** Est. $80,000. New P.W.A. Bids Apr. 7. Noted Apr. 13, C.D.

Texas—G. Gilchrist, state hy. engr., Austin, constructing K. C. S. R.R. underpass, and roadway approaches, on Hy. 8, Jefferson Co., and underpass on Frio City Road, under S. P. R.R. tracks, St. Mary St., San Antonio, Bexar Co., to Brown & Root, 708 Colorado St., Austin, and Galveston, **$93,383** and **$214,140** respectively est. $100,000 and $200,000 respectively. New **P.W.A.** Bids May 20. Noted May 28, C.D.

Texas—G. Gilchrist, state hy. engr., Austin, constructing T. and P. railway underpass and approaches, and 1 rein.-con. bridge, Hy. 1, WPGH 132-B, Parker Co., to Austin Bridge & Road Co., 1813 Clarence St., Dallas, **$86,733.** Est. $120,000. New **P.W.A.** Bids Apr. 29. Noted May 14, C.D.

Texas—G. Gilchrist, state hy. engr., Austin, constructing 2 underpasses, Missouri, Kansas & Texas R.R. and Texas and New Orleans R.R., Hy. 66, WPGM 2390, Bexar Co., to Central Bitulithic Co., P. O. Box 5343, Dallas, **$133,027** est. $140,000***concrete piers and concrete abutments on treated timber piling, constructing

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M. K. and T. underpass and roadway appro... Hy. 43, WPGH 427, Williamson Co., and ... structing T. & N. O. R.R. overpass and ... way approaches, Hy. 16, WPGH 151-B ... Co., to E. W. Hable, Corsicana, **$59,591** ... **$119,067** respectively est. $60,000 and ... 000 respectively. Grand total $311,688. ... May 19. New **P.W.A.** Noted May 28, C.D.

Texas—G. Gilchrist, state hy. engr., A... cleaning and painting Colorado River ... Hy. 3, Job M-13-L-6, Colorado Co., and G... lupe River Bridge, Hy. 12, Job M-13-K-6 ... toria Co. to J. F. Buckner, Cleburne, $... and **$808** respectively. Est. $4,000 and $... respectively. Bids May 20. Noted May ... C.D.

Texas—G. Gilchrist, state hy. engr., Au... constructing Southern Pacific R.R. underpass ... approaches, Hy. 33 W.P.G.M. 784-C, El ... Co., to F. Hall, Waco, **$84,755.** Est. $90,... Bids May 20. New **P.W.A.** Noted June 2, ...

Virginia—See "Streets and Roads."

West Virginia—State Hy. Comn., Charles... constructing substructure, Romey Bridge, N... 202C, Hampshire Co., to J. M. Francesa & ... Fayetteville, **$33,076***superstructure for ... bridge, to E. R. Mills, Charleston, **$84,211*** ... bridge and approaches, WPGH 185D, Harris... Co., to Tidewater Constr. Corp., Norfolk, $1... **607***Grassy Bridge WPSO 269, Mercer ... to Brown, Murphy & Wright, Princeton, $... 354. Bids June 2. Grand total $330,248. Rejected bids June 2, bridge and approach, PWS 84... Morgan and Berkeley Counties; bridge and ... proach, PWS 843C, Morgan Co.; Fisher Bridge ... Largent Rd., PWS 843D, Morgan Co. Noted May 21, C.D.—May 28, E.N.-R.

Wisconsin—State Hy. Dpt., Madison, ... structing structure, Bridgeport-Wauzeka R... Crawford Co., to A. R. Coffeen, Decorah, I... **$18,211***structure, Pewaukee Watertown ... Portage Rd., Columbia Co., to Mid-State Const... Co., 821 Miami Pass, Madison, **$27,999***... structures, Green Bay Rd., Ozaukee Co., to W... Blake & Sons Constr. Co., 403 East South River ... St., Appleton, **$18,058***constructing one 2... ft. high truss structure, Dunn Co., to L. ... Arnold, Inc., Eau Claire, **$36,873***two stru... tures, two 24 ft. 7 in. I-beam and timber trestle ... spans, Crawford Co., to H. Turner & Son... Wauzeka, **$9,413.** Grand total $110,554. Bids June 5. Noted June 9, C.D.

Wisconsin—See "Streets and Roads."

Wis., Milwaukee—Chicago, Milwaukee, St. Paul & Pacific R.R. Co., W. H. Penfield, ch... engr., Chicago, Ill., constructing concrete abutments, steel bridge, at 84th St. subway, to Reppart & Fulton Co. & J. P. Halley Co., Minneapolis, Minn., **$62,401.** Bids Apr. 28***constructing abutments, steel bridge at Rawson Ave., subway, to Foley Bros., Inc., New York Bldg., St. Paul, Minn., **$77,088.** Bids May 4.

Wis., Racine—City, concrete bridge, to Bondgard Constr. Co., Racine, **$91,604. P.W.A.** Bids May 29. Noted June 4, C.D.—June 11, E.N.-R.

STREETS AND ROADS

BIDS ASKED

†Arizona—June 25, by Pub. Rds., Phoenix, grading 1.854 mi. Clifton-Alpine Natl. Forest Rd., Crook Natl. Forest, Greenlee Co., incl. 49,850 cu.yd. unclassified and 300 cu.yd. structural excav.

Calif., San Mateo—E. W. Foster, city clk., taking bids grading 120,000 sq.ft. pavement, sidewalks, curbs, gutters, etc., North Fremont St., etc. E. P. Wilsey, city engr.

Connecticut—June 22, by State Hy. Dpt., J. A. Macdonald, comr., Hartford, grading, gravel fill sub-base 897 ft. Route 8, Dead Man's Curve, Naugatuck; plate girder overpass U. S. Route 6-A, Andover; repairing bridge Mashamoquet Brook, Route 93, Brooklyn-Pomfret Rd., Pomfret; bituminous macadam paving 1.505 ft Porter Ave., Arch St., also rolled bank run gravel surfacing 560 ft. Gunntown Rd., Naugatuck; waterbound macadam paving 17,289 ft. Belden Hill and New Canaan Rds., Wilton. To exceed $25,000.

Indiana—June 23, by State Hy. Comn., J. D. Adams, chn., Indianapolis, bituminous coated aggregate surfacing 4.047 mi. State Rd. 50, Greendale, Dearborn Co.; and bituminous retread on stabilized surfacing 1.136 mi, State Rd. 60, Salem, Washington Co.

Kentucky — July 1, by State Hy. Comn., Frankfort, bituminous surface type 1, surface treating, Group 1, 5 mi. Liberty-Danville Rd., M.P.23-H, Casey Co.; 4.07 mi. Lawrenceburg-Bardstown Rd., M.P. 44-B, 2.306 mi. Lawrenceburg-Versailles Rd., M.P. 20-C- and 20-C-1, both Anderson Co., 3.56 mi. Danville-Harrodsburg Rd., M.P. 22-D, both 4.166 mi. Danville-Stanford Rd., M.P. 22, both Boyle Co., 12.564 mi. Frankfort-Owenton Rd., M.P. 60-C, Franklin Co.; Group 2, 7.156 mi. Richmond-Paint Lick Rd., M.P. 25-G, Madison Co., 10.301 mi. Winchester-Irvine Rd., M.P. 185-A, Clark Co., 3.119 mi. Lancaster-Stanford Rd., M.P. 23-E, 4.79 mi. Buena Vista-Burgin Rd., M.P. 23-P, both Garrard Co., 7.758 mi. Nicholasville-Lancaster Rd., M.P. 23-C, Jessamine Co.; Groups 3, 26.886 mi. Harlan-Whitesburg Rd., M.P. 6-M, 3.21 mi. Cumberland-Lynch Rd., M.P. 56-A-1 and 56-A-2, 5.681 mi. Harlan Pennington Gap Rd., M.P. 530-A, all foregoing in Harlan Co.; Group 4, 16.154 mi. Jackson-Campton Rd., M.P. 4-F, and 11.339 mi. Jackson-Hazard Rd., M.P. 4-G-1, both Breathitt Co., Group 5, 8.882 mi. Ashland-

Streets and Roads (Continued)

Greenup Rd., M.P. 20-R, 0.593 mi. Russell-Raceland Rd., M.P. 20-R-2, 6 mi. Greenup-Grayson Rd., M.P. 28-R-1, 6.382 mi. Greenup-Raccoon Rd., M.P. 472-A, and 1.85 mi. Russell-Simmington Rd., M.P. 473-A, all foregoing in Greenup Co.

Massachusetts—June 23, by Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., G. H. Delano, ch. engr., 100 Nashua St., Boston, standard rein.-con. or sheet type concrete surfacing 32,400 sq.yd., standard bituminous macadam or penolithic type surfacing 25,730 sq.yd., bituminous concrete sidewalks 1,590 sq.yd., steel stringer bridge with rein.-con. deck, F.A.P. 259-A, Pittsfield, to exceed $200,000; gravel and tar mixed in place surfacing 18,500 sq.yd., Project W.P.G.S. 271, Foxborough and Mansfield, $20,000 or more.

Nevada—State Hy. Comn., Carson City, taking bids asphaltic road mix surfacing 18.28 mi. Route 2, Sect. E1, F.A. between ½ mi. west Eastgate and Campbell Creek Ranch, Churchill and Lander Counties; 14.98 mi. Route 3, Sects. A3, G, between 9.5 mi. east Yerington and Schurz, Lyon and Mineral Counties; 14.07 mi. Route 4, Sect. D2, between 7 mi. northeast of Lockes and Callways, Nye Co.; constructing state highway 9.41 mi. between 6 mi. east of Fallon and Stillwater, Churchill Co.

Nevada—State Hy. Comn., Carson City, taking bids asphalt road mix surfacing 7.98 mi. road from Sparks to Junction Route 33, Washoe Co.

N. Y., Elmira—See "Contracts Awarded."

N. Y., Newburgh—See "Contracts Awarded."

N. Y., New York—June 23, by J. J. Lyons, pres. Bronx Boro, Bronx County Bldg., 161st St. and Grand Concourse, granite block paving Westchester Ave.; sheet asphalt on concrete paving Creston Ave., East 141st and East 156th Sts.

N. Y., St. George—June 24, by J. A. Palma, pres. Richmond Boro, Boro Hall, asphalt block repaving St. Paul's Ave.; bituminous concrete paving and asphalt block paving Clove Rd.

N. Y., Utica—City, taking bids paving 24 city streets. Bids to be taken in lots of 4 or 5 streets every Friday until all contracts are awarded. $100,000. J. B. Shaw, city engr.

Ohio—J. J. Jaster, Jr., dir. State Hy. Dpt., Columbus, rejected bids May 26, Proposal 1, brick paving, constructing Bridge CU-82-127A, concrete with steel beams over Chippewa Creek, constructing Bridge CU-82-131 over same road, $223,426; Proposal 2, brick paving, roadside improvement 0.141 mi. part Broadview Heights Sect., part Breckville Sect., Twinsburg Elyria Rd., State Hy. 36, State Route 82, Cuyahoga Co. Noted May 18, C. D.—May 21, E. N.-R.

Ohio—June 26, by J. J. Jaster, Jr., dir. State Hys., Columbus, grading, drainage structures, traffic bound paving 3.016 mi. Jericho Rd., County Hy. 33, Defiance Co., $18,580; 1.506 mi. Keonig Rd., Auglaize Co., $10,378; 2.586 mi. Township Rd. 226, Jefferson and Buck Twps., Tuscarawas Co., $17,438; 3.749 mi. New Franklin Lisbon Co. Rd., West Twp., Columbiana Co., $19,183; 1.591 mi. Sect. A, Heywood Rd., County Hy. 24, Margaretta Twp., Erie Co., $10,362; 3.01 mi. Sects. C and D, County Hy. 256, Aurora and Manuta Twps., Portage Co., $12,355; 3.342 mi. Mudsock Lecta Rd., County Hy. 24, Green and Perry Twps., Gallia Co., $20,177; 1.721 mi. Newport Cornerville Rd. Township Hy. 47,390, Newport Twp., Washington Co., $17,055; 1.003 mi. Annapolis Twp. Ridge Rd., County Hy. 40, Jefferson Co., $7,134; 0.869 mi. Penny Rd. County Hy. 72, Newton Twp., Miami Co., $14,823; bituminous macadam surface treating 4.256 mi. part Sects. E, D, A, Ashland Medina Rd., State Hy. 139, U. S. Route 42, Ashland Co., using aggregate Sect. M-3.1 or M-3.93, $22,209 or M-3.3, $21,-151; 1.657 mi. part Sect. E, Logan Athens Rd., State Hy. 155, State Route 31, Athens Co., using aggregate M-3.6, $7,253 or Sect. M-3.1 or M-3.93, $7,301; grading, drainage structures, waterbound macadam paving 1.09 mi. Cable Rd., County Hy. 59, Erie Co., $10,-572; grading 3.334 mi. Buckeye Furnace Rd., Township Rd. A-5, Jackson Co., $16,340; hot mixed, hot laid asphaltic resurfacing 4.375 mi. part Sect. R, National Rd., State Hy. 1, U. S. Routes 22 and 40, Muskingum Co., $27,006; 2.928 mi. part Sect. Q, part New Concord Sect. National Rd., State Hy. 1, U. S. Routes 22 and 40, Muskingum Co., $18,724.

Pennsylvania — June 26, at office W. Van Dyke, secy., Hys., Harrisburg, dual type paving, extending 2 structures, etc., 7.100 ft. R-281, Sect. 4, Middletown Twp., Bucks Co., involving 15,115 cu.yd. Class 1, 2,278 cu.yd. Class 2, 8,445 cu.yd. borrow excav.; dual type paving, extending rein.-con. bridge, etc., 10,100 ft. R-281, Sect. 6, Middletown Twp., Bucks Co., 8,960 cu.yd. Class 1, 742 cu.yd. Class 2 and 2,966 cu.yd. borrow excav.; bituminous on native stone or crushed aggregate surfacing 408 ft. R-11027, Sect. 1, Lilly Borough, Cambria Co., 416 cu.yd. Class 1 and 10 cu.yd. Class 2 excav.; bituminous on native stone surfacing 6,171 ft. R-65, Sect. R-1, Elk, Paint and Clarion Twps., Clarion Co., 11,489 cu.yd. Class 1, 362 cu.yd. Class 2 and 365 cu.yd. borrow excav.; dual type paving, consisting of two 17 ft. rein.-con. lanes and 10 ft. bituminous on concrete paving 10 ft. lane, 5,048 ft. R-142, Sect. 4, Lower Merion, Radnor and Haverford Twps., Delaware and Montgomery Counties, 500 cu.yd. Class 2 excav.; encased I-beam bridge, dual type pavement two 10 ft. lanes, grading, drainage 2,800 ft. for railroad tracks, bituminous on crushed aggregate surfacing 1,800 ft. R-35, Sect. 2, Southampton Twp., Shippensburg Borough, Franklin Co., 19,065 cu.yd. Class 1 and 2,257 cu.yd. Class 2 excav.; rein.-con. paving, bituminous on native stone or crushed aggregate surfacing, rein.-con. bridge 21,200 ft. R-36, Antrim Twp., Franklin Co., 21,545 cu. yd. Class 1, 1,225 cu.yd. Class 2 and 24,975 cu.yd. borrow excav.; 1 rein.-con. curb type gutter 5 ft. 7 in. wide on each side of existing pavement 910 ft. R-35009, Sect. 5, Scranton, Lackawanna Co.; grading, drainage, extending existing stone arch 17,279 cu.yd. R-43072, Sandy Lake and Mill Creek Twps., Mercer Co., 325 cu.yd. Class 2 excav.; bituminous on concrete base Type B paving trolley area and on existing brick pavement, etc., 3,345 ft. R-35047 and R-296, Forest City Borough, Susquehanna Co., 1,711 cu.yd. Class 1 and 250 cu.yd. Class 2 excav.

South Carolina—State Hy. Dpt., Columbia, rejected bids May 19, bituminous retreading 20,234 mi. Route 34, State Projects 91 and 67, Contr. 2, Kershaw and Lee Counties; 13.723 mi. Route 6, State Project 589 C, D and E, Contr. 3, Orangeburg and Bamberg Counties; 7.463 mi. Route 391, State Project 793, Contr. 3, Newberry Co.; 11.236 mi. Route 15, State Project 273, Contr. 2, Clarendon Co. Will readvertise. Noted May 27, C. D.—May 14, E. N.-R.

Tex., Kilgore—City, R. H. Laird, mayor, soon takes bids permanent street paving and improvement. $200,000. Bonds voted for same.

CONTRACTS AWARDED

California—C. H. Purcell, state hy. engr., 808 State Bldg., Los Angeles, application of plant mix surfacing 20,450 tons plant mix surfacing and 171,500 sq.yd. asphaltic paint binder on 14.6 mi. hy. between Santonio Creek and Ojai, Ventura Co., to Southwest Paving Co., 11,402 Radford Ave., Roscoe, **$58,818.** Bids May 28. Noted June 1, C. D.

†**California**—Pub. Rds., San Francisco, grading 5.835 mi. Sects. A3 and A4, Route 3, Big Oak Flat Rd., Yosemite Natl. Forest, Mariposa Co., to W. Von der Hellen, Medford, Ore., **$369,-376.** Est. $355,716. Bids June 4. Noted June 11, C. D.

†**Calif., San Francisco**—Con. Q.M. Fort Mason, constructing curbs and parking area at Letterman General Hospital, Presidio, to A. G. Raisch, 1 De Haro St., **$1,580.** Bids May 22.

Colorado—State Hy Dpt., Denver, gravel surfacing 3.461 mi. hy. between Idaho Springs and the foot of Floyd Hill on State Hy. 2, Clear Creek Co., to M. E. Carlson, 4483 Newton St., Denver, **$141,754;** gravel surfacing 4.109 mi. hy. between Cotopaxi and Texas Creek on State Hy. 6, Fremont Co., to Owen, Babb & Thorkildsen, 1475 Monaca Blvd., Denver, **$108,601.** Bids May 26, awarded May 29. Noted June 2, C D.

Connecticut—State Roads Comn., J. A. Macdonald, state hy. comr., Hartford, loose gravel surfacing 28,583 ft. hy. Middlebury, to C. W. Blakeslee & Sons, Inc., 58 Waverly St., New Haven, about **$32,000***** trunk line, bridges, culverts, Haddam, to Brunalli Constr. Co., New Britain, **$21,218***** wing walls and culvert trunk line, Washington, to T. Zoli, 1 Eno Ave., Torrington, **$8,288.** Grand total $61,506. Bids May 11. Noted May 8, C. D.—May 7, E. N.-R.

Ill., Freeport—Dpt. P. Wks. & Buildings, Div. Hys., traffic bound surface course paving 0.5603 mi. Sect. 13-MFT., Stephenson Co., to J. C. Schultz, Albany, **$35,490.** Bids Apr. 20.

Ill., Pekin—Dpt. P. Wks. & Buildings, Div. Hys., traffic bound surface course paving 4.2928 mi. Sect. 5-MFT, Tazewell Co., to Janson & Schaefer, Pekin, **$41,352.** Bids Apr 17. Noted Apr. 6, C.D.-Apr. 9, E.N.-R.

Ill., Pinckneyville—Perry Co., traffic bound surface course paving 5.0625 mi. Sect. 4 G.M.F.T., near Denmark, to Barnett & McCoy Constr. Co., Carbondale, **$45,318. P.W.A.** Bids May 7. Noted May 1, C. D.

Indiana—State Hy. Comn., Indianapolis, rein.-con. and rock asphalt paving 2.911 mi. Delaware Co., to Berns Constr. Co., 309 West Washington St., Indianapolis, **$161,569.** Est. $200,-914. Bids Apr. 21. Noted Apr. 27, C. D.—Apr. 16, E. N.-R.

Ia., Muscatine—Muscatine Co., K. Coder, aud., grading 51.85 mi. road, incl. 392,000 cu.yd. excav., to McGuire Bros., Forest City, **$26,463.** Bids May 28, awarded May 28. Noted May 25, C. D.

★**Kansas** — State Hy. Comn. at office of County Clerk, Ashland, (**P. means Project**), to C. Hulme, Great Bend, light type surfacing 11.118 mi. P. 160-13-FA 461 A, Clark Co., **$6,698;** 1.178 mi. P. 25-6-FA 492 C, Kearny Co., **$802;** 5.785 mi. P. 83-9-FA 248 C, Finney Co., **$3,406;** 9.703 mi. P. 83-9-FA 248 D, **$7,091;** 4.659 mi. P. 83-9-FA 248 E, **$2,207,** all in Finney Co.; 1.063 mi. P. 23-2-FA 471 A, Meade Co., **$1,204;** 7.665 mi. P. 83-10-FA 248F, Scott Co., **$5,820***** to J. H. Shears Sons, Hutchinson, 4.644 mi. P. 27-4-FA 358 E, **$998;** 0.969 mi. P. 27-4-FA 358 I, **$4,782,** both Stanton Co.******* to San Ore Constr. Co., McPherson, 4.126 mi. P. 45-1C-FA-474 D, Morton Co., **$3,523;** bituminous material surfacing 18.882 mi. P. 50N 6 A-FA 359 E, **$70,-761;** 5.981 mi. P. 50N-6BOFA 359 B, **$22,539;** 6.969 mi. P. 50N-6C-FA 359 B, **$26,263,** all foregoing in Finney Co.; 12.844 mi. P. 45-6A-FA 416 A, Gray Co., **$53,021;** 1.506 mi. P. 45-5-FA 416 B, Haskell Co., **$50,875;** 18.668 mi. P. 50N-7-FA 359 A, Hodgeman Co., **$72,422***** to N. R. Sanford, Horsington, earthwork and

†*Federal Government*

Constr. News page 429

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Streets and Roads (Continued)

culverts 4.964 mi. P. 50N-6A-FA 359 F, Finney Co., **$19,045*****to A. L. Cook, Ottawa, 11.104 mi. P. 160-13-FA 461A, Clark Co., **$160,782*****to Stamey & Tidd, Hutchinson, 3.263 mi. P. 45-2B-FA 474 C, Stevens Co., **$13,098**; 5.785 mi. P. 83-9-FA 248 C, Finney Co., **$19,776**; 7.088 mi. P. 27-4-FA 358 H, Stanton Co., **$23,804**; 9.703 mi. P. 83-9-FA 248 D, Finney Co., **$20,934**; 7.665 mi. P. 83-10-FA 248 F, Scott Co., **$17,746**; earthwork, culverts, concrete paving 4.692 mi. P. 83-9-FA 248 Efl, Finney Co., **$32,905**. Grand total $640,201. Bids June 2. Noted May 19, C. D.—May 21, E. N.-R.

Kansas—State Hy. Comn. at office of County Clerk, Concordia, (**P. means Project**), to Inland Constr. Co., Topeka, bituminous mat, surfacing (road mix, densely graded type), 5.979 mi. P. 40N-24-FA 385 A, **$32,443**; 1.945 mi. P. 40N-24-FA 284 A, **$9,166**; 6.972 mi. P. 40N-23-FA 284 B, **$37,120**; 5.261 mi. P. 40N-22-FA 284 D, **$31,218**, all foregoing in Clay Co.; 2.14 mi. P. 40N-21-FA 185-E, **$16,533**; 5.601 mi. P. 40N-22-FA 200 A, **$32,896**; 4.191 mi. P. 40N-22-FA 200 B, **$26,739**; 0.609 mi. P. 40N-22-FA 284 I, **$3,601**, all foregoing in Cloud Co. ***to C. I. Erickson, Assaria, scale house and approaches 0.082 mi. P. 81-11-NRH 278 E, McPherson Co., **$5,536*****to F. H. Freeto, Pittsburg, earthwork and culverts 3 mi. P. 13-6-FA 434 B, Morris Co., **$52,557**; bridge 6.8, two 10x10x32 ft., rein.-con. beam span, P. 13-6-FA 434 B, **$2,887**, both Morris Co.***to M. W. Watson, National Bank of Topeka Bldg., Topeka, resurfacing 8 mi. P. 4-13-6821, **$2,395**; 8.4 mi. P. 4-14-6822, **$2,515**, both Dickinson Co.***to Blue Valley Gravel & Sand Co., Fairbury, Neb., sand gravel or limestone for cover material surfacing 10.6 mi. P. 36-16-6810, **$2,133**; 4.9 mi. P. 36-17-6811, **$936**; 10 mi. P. 36-19-6802, **$1,840**; 2.5 mi. P. 36-18B-6803, **$461**; 1.9 mi. P. 36-18A-6804, **$350**, all foregoing in Jewell Co.; 7.3 mi. P. 36-20-6812, **$1,260**; 7.6 mi. P. 36-20-6813, **$1,294**, both Republic Co.***to Cook & Cone, Ottawa, 5 mi. P. 40N-17-6875, Mitchell Co., **$2,035**. Grand total $266,455. Bids June 6. Noted May 25 and June 2, E. N.-R.—May 28, E. N.-R.

Kansas—State Hy. Comn., at office County Clerk, Lawrence, (**P means Project**), to Blue Rapids Gravel Co., Blue Rapids, roadside improvement 6.018 mi. P. 75-23-FA 264-C, Osage Co., **$28,190**; resurfacing 12.7 mi. P. 11-28-6866, Marshall Co., **$3,600*****to M. W. Watson, National Bank of Topeka Bldg., Topeka, roadside improvement 5.997 mi. P. 75-24-FA 99, **$32,058**; 3.934 mi. P. 75-24-FA 106 A, **$21,360**; 0.593 mi. P. 75-24-FA 106 B, **$6,395**; scale house and approaches 0.082 mi. P. 40-31-NRH 355 J, **$5,896**, all foregoing in Shawnee Co.***to H. J. Hall Constr. Co., Manhattan, bituminous material surfacing road mix, densely graded type, 4.484 mi. P. 40N-26-FA 409 A, **$23,522**; 8.086 mi. P. 40N-25-FA 385-B, **$51,471**, both in Riley Co.***to B. Metzger, Ozawkie, limestone for cover material surfacing 3.3 mi. P. 79-1-6837, **$980**; keystone for cover material surfacing (stock pile) 4 mi. P. 24-7A-6838, **$1,560**; 6.6 mi. P. 24-7B-6839, **$2,063**; 5.1 mi. P. 62-1-6836, **$1,723**, all foregoing in Jackson Co.***to Collins Constr. Co., Leavenworth, limestone for cover material surfacing (stock pile) 6.9 mi. P. 5-1-6835, Leavenworth Co., **$1,937**. Grand total $180,755. Bids May 29. Noted May 19, C. D.—May 21, E. N.-R.

Kansas—State Hy. Comn. at office of County Clerk, Leavenworth, (**P. means Project**), to Collins Constr. Co., Leavenworth, Keystone for cover material surfacing 4.8 mi. P. 7-33-6603, **$1,500**; 1.6 mi. P. 59-28-6851, **$500**; 5.3 mi. P. 159-1-6852, **$1,956**; 8.7 mi. P. 159-2-6853, **$3,303**; 4.5 mi. P. 159-3-6854, **$1,727**, all foregoing in Atchison Co.; limestone for cover material surfacing 6.1 mi. P. 7-34-6849, **$1,928**; 4.7 mi. P. 7-35-6850, **$1,593**, both Doniphan Co.***to B. Metzger, Ozawkie, keystone for cover material surfacing 8.8 mi. P. 9-28-6857, **$2,970**; 2.3 mi. P. 9-29-6858, **$778**, limestone for cover material surfacing, 9.6 mi. P. 75-29-6671, **$3,120**; 4.3 mi. P. 75-3-6842, **$1,458***** to M. W. Watson, National Bank of Topeka Bldg., Topeka, 18.4 mi. P. 25-28-6841, **$4,991**, all foregoing in Jackson Co.; 7.1 mi. P. 10-9-6860, **$2,167**; keystone for cover material surfacing 2 mi. P. 40N-31B-6859, **$560**, both Shawnee Co., to Yant Constr. Co., 1115 Omaha Natl. Bk. Bldg., Omaha, Neb., 13.1 mi. P. 75-31-6843, **$4,690**; 7.6 mi. P. 36-32-6846, **$2,774**; 9.7 mi. P. 36-33-6847, **$3,396**, all foregoing Brown Co.***to Imperial Constr. Co., Leavenworth, limestone for cover material surfacing 5.8 mi. P. 50N-29-A, 6824, **$2,139**; 2.3 mi. P. 50N-29B-6825, **$850**; 1.3 mi. P. 78-1-6828, **$481**, all foregoing in Lyon Co.; 5.7 mi. P. 50N-30-6826, **$2,103**; 1.6 mi. P. 31-4-6827, **$590**; 9.7 mi. P. 75-22-6840, **$3,590**, all foregoing in Osage Co.; keystone for cover material surfacing 3.8 mi. P. 50N-28-6823, Lyon Co., **$2,008*****to O. H. Schmidt, St. Joseph, Mo., 9.4 mi. P. 36-27-6844, Marshall Co., **$3,901**; 9.5 mi. P. 36-28-6845, Nemaha Co., **$3,802***** to Cook & Cone, Ottawa, 8.8 mi. P. 11-14B-6833, **$3,014**; 0.7 mi. P. 11-15-6834, **$241**; 6.9 mi. P. 11-14A-6832, **$2,365*****to Independent Constr. Co., Pittsburg, chat for cover material surfacing 13.4 mi. P. 11-13-6831, **$3,819**, all foregoing in Lyon Co.***to Blue River Sand & Gravel Co., Blue Rapids, sand gravel for cover material surfacing 10.1 mi. P. 9-22A-6855, **$2,804**; 1.8 mi. P. 9-22B-6856, **$500**, both Marshall Co. Grand total $71,621. Bids May 22. Noted May 12, C. D.—May 14, E. N.-R.

Kansas—State Hy. Comn., at office Co[illegible]y Clerk, Phillipsburg, (**P. means Project**) [illegible] M. W. Watson, National Bank of Topeka Bl[illegible] Topeka, light type surfacing 6.004 mi. P. 23[illegible] FA 464 C, Gove Co., **$4,131**; bituminous m[illegible] rial surfacing 6.064 mi. P. 40N-10FA 311 [illegible] **$26,843**; 2.524 mi. P. 40N-10-FA 311 B, $1[illegible] 174; 3.552 mi. P. 40N-11-FA 379 A, $15,7[illegible] all foregoing in Graham Co.***to D. B. H[illegible] man, Alton, O.476 mi. P. 8-21-FA 170 [illegible] Part 1, **$3,878**; 2.467 mi. same road, Part [illegible] **$16,958**; 0.805 mi. P. 40N-15-FA 170 BC, P[illegible] 3, **$3,937**; 3.241 mi. P. 40N-15-FA 170 [illegible] Part 1, **$15,853**; 0.252 mi. P. 8-20-FA 170 [illegible] Part 2, **$1,232**; 5.4 mi. P. 40N-14-FA 371 [illegible] **$24,663**; 5.11 mi. P. 40N-14-FA 371-C, $2[illegible] 338; 8.598 mi. P. 40N-14-FA 371 D, $39,2[illegible] all foregoing Osborne Co.; 5.395 mi. P. 40N-1[illegible] FA 371 E, **$22,763**; 5.204 mi. P. 40N-13-F[illegible] 371 F, **$21,957**; oil penetration surfacing 1.2[illegible] mi. P. 40N-13-K-1594, **$2,107**, all foregoi[illegible] Rooks Co.***to List & Clark, Railway Exchan[illegible] Bldg., Kansas City, Mo., earthwork and culver[illegible] 1.14 mi. P. 1-21-FA 210 A, **$26,542**; 2.336 [illegible] P. 1-21-FA 210 B, **$22,001**; 2.351 mi. P. 1-2[illegible] FA 210 C, **$30,465*****to D. G. Hansen, Loga[illegible] light type surfacing 4.097 mi. P. 83-23-FA 34[illegible] G. Part 1, **$5,406**; 0.252 mi. P. 83-23-FA 343 [illegible] Port 2, **$332**; 7.465 mi. P. 83-23-FA 343H[illegible] **$9,847**; 10.4 mi. P. 1-21-FA 300A, **$14,172**, a[illegible] foregoing Phillips Co.***to H. J. Hall, Manhat[illegible] tan, earthwork and culverts 2.197 mi. P. 281[illegible] 1-FA 528 A, Smith Co., **$19,194*****to L. F[illegible] Harper, Great Bend, levee, jetties and concret[illegible] rip rap 0.16 mi. P. 21-15-FA 413 A, Graham[illegible] Co., **$7,982**. Grand total $369,772. Bids June 4. Noted May 19, C. D.—May 21, E. N.-R.

Maryland — State Roads Comn., Baltimore[illegible] macadam paving 3.72 mi. Creswell-Fountain[illegible] Creek Rd., Contr. H-201-1-45, Harford Co., to T. B. Gatch & Sons, 5937, Belair Rd., Baltimore, **$63,728**. Bids June 2. Noted June 15, C. D.

★**Mississippi** — E. D. Kenna, dir. State Hy. Comn., Jackson, alternate types paving 14.143 mi. Brooklyn-Hattiesburg Hy., Forrest Co., and 9.335 mi. Jackson-Hazelhurst Hy., Hinds and Copiah Counties, to Barber Bros Constr. Co., Baton Rouge, La., **$269,264** and **$250,586** respectively***14.109 mi. Pickens-Durant Hy., Holmes Co., to Cornell Young Co., Macon, Ga., **$317,378*****7.773 mi. Canton-Pickens Hy., Madison Co., to Espy Paving & Constr. Co., 2821 Bull St., Savannah, Ga., **$177,452*****5.554 mi. Island-Cleveland Hy., Bolivar Co., to Burdine Constr. Co., Shaw, **$128,285*****12.788 mi. Tupelo-Corinth Hy., Prentiss and Alcorn Counties, and alternate groups A or B pavement 10.505 mi. Tunica-Memphis Hy., Tunica Co., to Carey-Reid Co., Lexington, Ky., **$350,956** and **$227,355** respectively***4.085 mi. Grenada-Memphis Hy., Yalabusha Co., to Zeigler Constr. Co., Nashville, Tenn., **$94,344**. Grand total $1,815,620. **P.W.A.** Rejected bids May 19, concrete paving 13.614 mi. Groups A-12 or C-2, pavement Mt. Olive-Mendenhall Hy., Simpson and Covington Counties, $260,000. **P.W.A.** Bids May 19. Noted May 27, C. D.—May 14, E. N.-R.

Mo., Independence—Jackson Co., furnishing, applying about 1,000,000 gal. road oil, to Missouri Contg. Co., 1927 Woodward Ave., Kansas City, at 6.55c. per gal. Bids May 18. Noted May 12, C. D.

Nevada—State Hy. Comn., Carson City, constructing 4.86 mi. state highway, between Lawton and Reno, Washoe Co., to Dodge Constr. Co., Fallon, **$201,770*****3.66 mi. state hy. from junction State Route 3 to Genoa, Douglas Co., and constructing concrete steel overpass over Virginia & Truckee Ry. near Virginia City, Route 17, Sect. B, Storey Co., 225 cu.yd. structural excav., to Nevada Rock & Sand Co., 949 East 4th St., Reno, **$51,825** and **$14,125** respectively***asphaltic road mix surfacing 0.21 mi. road between Longdale and point 0.74 mi. south of Overton, Clark Co., to J. C. Compton, McMinnville, Ore., **$26,840**. Grand total $294,560. Noted May 27, C. D.

New Jersey—E. D. Sterner, comr. State Hy. Dpt., Trenton, paving 4 mi. road, Burlington Co., to Pangia Constr. Co., Atco, **$26,188**. Bids June 1. Noted June 9, C.D.

N. J., Freehold—Freeholders Monmouth Co., repairing and resurfacing 16 mi. West Freehold-Bradevelt-Holmdell-Sycamore Rds., Shrewsbury: Oceanport-Little Silver, Locust, Ninth Ave., Belmar; Sunset Ave., Ocean Township; Brinley Ave., Neptune; Squankrum-Lakewood and Allentown, Imlaystown Rds., to A. L. Randolph, Plainfield, **$66,770**. Bids June 3.

New York—A. W. Brandt, comr. Hys., Albany, improving 0.18 mi. road in Onondaga Co., to G. B. Dickinson, Inc., 309 Basin St., Syracuse, **$28,401** est. $28,464**6.25 mi. Herkimer Co., to Dale Eng. Co., 404 Court St., Utica, **$82,156** est. $90,465. Bids May 26. Received no bids May 26, improving 6.57 mi. road in Montgomery Co. Noted May 29, C. D.—May 14, E. N.-R.

N. Y., Brooklyn—**R. V. Ingersoll, pres.** Brooklyn Boro, Boro Hall, to Barry Contg. Corp., 20 West 141st St., resurfacing various streets with heater method $29,158; granite block paving Box St. $30,713; Rutledge St. $11,619***to Mill Basin Asphalt Co., East 54th St. and Avenue U, asphalt paving East 27th St. $8,781; West St. $7,689***to B. Turecamo Contg. Co., 1573 63rd St., granite block paving 3rd Ave. $141,557; asphalt block paving 59th St. $11,532; 76th St. $6,599; Bay 16th St. $6,292; East 17th St. $8,457; Marlboro Rd.

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†Federal Government

Streets and Roads (Continued)

$10,047; 11th Ave., $5,192***to Carblock Pavement Co., Yarrick Ave. and Stagg St., Bushwick Ave., $28,913; Jefferson St., $7,904. Grand total $314,453. Bids June 3. Noted June 5, C. D.

N. Y., Elmira—City, C. Hunter, mgr., oiling and stoning city streets, relief labor, $56,000. J. E. Williamson, Federal Bldg., Elmira, WPA purchasing officer will purchase materials.

N. Y., Jamaica—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, roadway and miscellaneous work at Jamaica Yard, to Wagner Larson Co., 44 Steuben St., Brooklyn, $71,844. Bids May 12. Noted May 13, C. D.—Apr. 30, E. N.-R.

N. Y., Newburgh—City, City Hall, penetration macadam paving 1st. Colden, Ann and Washington Sts., relief labor, $110,100. W.P.A., C. R. Woodhull, city engr. Materials to be purchased by W.P.A. Procurement Office, White Plains.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., granite block area, to S. B. Contracting Co., 139 156th St., $25,354. Bids June 2. Noted June 5, C. D.—June 1, E. N.-R.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, asphalt block paving and bituminous concrete paving Victory Blvd., to Road Material Corp., 17 State St., New York, $65,617. Bids May 29. Noted June 2, C. D.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, bituminous repaving Richmond Terrace and Richmond Rd., to Vanbro Constr. Co., 721 Arthur Kill Rd., $25,087 and $33,792 respectively. Noted May 28, C. D.—May 21, E. N.-R.

★ **North Carolina** — State Hy. and P. Wks. Comn., Raleigh (**P. means Project**), to E. W. Grannis, Fayetteville, grading 14.64 mi. P. 1070, Bertie and Hertford Counties, **$104,178*****to Wannamaker & Wells, Inc., Orangeburg, S. C., structures on same road, **$7,067*****to J. M. Gregory, Raleigh, bituminous surface treating 10.35 mi. P. 5982, Rockingham and Caswell Counties, **$31,339*****to Hardaway Constr. Co., 15 11th St., Columbus, Ga., 11.61 mi. P. 4921, Warren and Halifax Counties, **$30,889*****to Ames & Webb, Inc., Raleigh, concrete paving 0.23 mi. P. 303, Wake Co., **$14,391*****to P. A. Triplett, Chester, S. C., structures, overhead crossing Mumford Ave., Raleigh, P. 303, Wake Co., **$28,297*****to Hobbs-Peabody Constr. Co., 317 West Worthington Ave., Charlotte, structures, 2.68 mi. P. 8107, Burke Co., **$9,345*****to Blythe Bros., 424 South Brevard St., Charlotte, grading, artificial sand clay surfacing 2.68 mi. P. 8107, Burke Co., **$41,661*****to Reed & Abee, Inc., Asheville, concrete paving, bituminous concrete surfacing, mixed in place 0.54 mi. P. 9025, Buncombe Co., **$37,741*****to L. S. Bradshaw, Salisbury, bituminous concrete on concrete surfacing, concrete paving 0.62 mi. P. 9072, Buncombe Co., **$51,338*****to T. M. Strider & Co., Cotton States Bldg., Nashville, Tenn., grading, concrete paving 3.36 mi. P. 9073, Buncombe Co., **$147,274*****to L. A. Riddle & Co., Asheville, structures on same road, **$10,569**. Grand total $514,100. Bids May 28. Noted June 4, C. D.

Ohio—J. J. Jaster, Jr., dir. State Hy. Dpt., Columbus, stabilized material paving 5.575 mi. Sect. A, and Nellie Sect., Millwood-Newcastle-Nellie Rd., State Hy. 339, part Sect. E. Mt. Vernon-Coshocton Rd., U. S. Route 36, and constructing concrete bridge with continuous steel beams over Walhounding River, Coshocton Co., to W. P. McCarren, Walhounding, **$314,454**. Est. $356,775.

★ **Ohio**—J. J. Jaster, Jr., dir. State Hys., Columbus, bituminous macadam surface treating, using aggregate, Sect. M-3.6 on 6.639 mi. Trumbull Co., and 6.301 mi. Medina Co., to Tri-State Asphalt Corp., South Broadway, Martins Ferry, **$24,976** and **$24,580** respectively, est. $25,449 and $24,743 respectively***3.597 mi. Tuscarawas Co., to E. Spring, Inc., New Philadelphia, **$14,196** est. $14,467***11.425 mi. Geauga Co., and 6.691 mi. Lake Co., to Ohio Eng. Co., 105 Sixth St., Lorain, **$42,062** and **$24,338** respectively, est. $50,891 and $26,013 respectively***15.042 mi. Gallia Co., to Ohio Quarries Co., 150 East Broad St., Columbus, **$67,893** est. $74,847***using Sect. M-3.1 or M-3.92 aggregate 1.764 mi. Meigs Co., to L. T. Cisler & Son, P. O. Box 528, Marietta, **$8,625** est. $8,731***using aggregate Sect. M-3.3 or M-3.92 on 10.115 mi. Seneca Co., to L. Dehmer, Tiffin, **$33,377** est. $40,990***bituminous macadam resurfacing 6.519 mi. Logan Co., to C. E. Edgington, Findlay, **$32,370** est. $33,764***7.639 mi. Fayette Co., to T. D. Van Camp, 55 East State St., Columbus, **$42,603** est. $42,764***bituminous macadam surface treating 11.91 mi. Brown Co., to L. P. Cavett, 501 Shepard Ave., Lockland, **$52,708** est. $54,109***9.74 mi. Wyandotte Co., to Batdorf & Martin, 206 South 7th St., Upper Sandusky, **$34,509** est. $36,297***7.639 mi. Darke Co., to B. L. Baumgardner, 221 North Mill St., Celina, **$44,465** est. $49,371***6.417 mi. Mercer Co., to F. R. Creager, Maple Ave., Liberty Center, **$30,702** est. $32,471***Precote bituminous coated aggregate resurfacing 5.18 mi. Allen Co., to Taylor & Baldwin, 83 South High St., Columbus, **$24,189** est. $25,010*** roadside improvement 1.33 mi. Ashtabula Co., to S. Koval, 2359 Lee Rd., Cleveland Heights, **$3,235** est. $3,291. Grand total $504,794. Bids June 2. Received no bids June 2, bituminous macadam surface course on 1.295 mi. Ashland Co., **$7,133**; 1.657 mi. Athens Co., **$7,301**. Noted May 21, C. D.—May 28, E. N.-R.

Oklahoma—State Hy. Dpt., Oklahoma City, concrete paving 6.87 mi. LeFlore Co., to Brooks & Dahlgren, Inc., Insurance Bldg., Oklahoma City, **$201,052** est. $210,000***grading, drainage 1.319 mi. Jefferson Co., to Blackburn Constr. Co., Healdton, **$24,968** est. $25,338*** 4.41 mi. Tillman Co. and 1.8 mi. in Kingfisher Co., to Lee Pool & Son, Fairview, **$23,704** and **$9,271** respectively, est. $25,820 and $9,321 respectively. Grand total $258,995. Bids June 2. Noted May 29, C. D.

Pa., Sinking Spring—Town, asphalt paving and repairing various streets, to Windsor Service, Inc., Reading. Contractor will furnish asphalt at 11c. per gal., limestone chips at 1.70 per ton and do work on cost plus basis. Total est. $27,000. B. Greath, Burgess.

South Carolina—State Hy. Dpt., Columbia, bituminous surfacing 5.727 mi. Route 47, State Project 861, Orangeburg Co., to Hardaway Contg. Co., 15 11th St., Columbus, Ga., **$55,838**. Bids May 5. Noted May 13, C. D.—Apr. 30, E. N.-R.

South Carolina — State Hy. Dpt., Columbia, earth grading 2.664 mi. U. S. Route 29, W.P.M.H. 428, Greenville Co., to E. W. Grannis, Fayetteville, N. C., **$134,175*****3.865 mi. Route 52, W.P.G.H. 343, Chesterfield Co., to Pennell & Harley, Inc., Spartanburg, $60,851***bituminous surfacing 5.6 mi., hy., F.A.P. 361-B, Orangeburg Co., to E. D. Sloan, Greenville, **$30,402*****earth grading, 100 ft. combination bridge over Spears Creek, 7.293 mi. county road, W.P.S.O. 415, Kershaw Co., to Hooper Constr. Co., Bunnell, Fla., **$69,203**. Grand total $294,631. Bids May 19. Noted May 27, C. D.—May 14, E. N.-R.

Tennessee—State Hy. Dpt., Nashville, paving 6.581 mi. State Hy. 112, F.A.P. 239 A, Cheatham and Robertson Counties, to F. C. Gorrell & Sons, Russellville, Ky., **$111,865*****2.84 mi. State Hy. 76, W.P.H. 280-E, Stewart Co., to Municipal Paving & Constr. Co., 316 South First St., Nashville **$42,456*****grading, drainage 1.254 mi. Non-System Hy., W.P.S.O. 419-B, Bradley Co., to Bell & Bell, Dickerson Pike, Nashville, **$83,467*****overhead and approaches on 0.406 mi. State Hy. 59, over N. C. and St. L. R.R., W.P.G.S. 402-B, Fayette Co., to Zeigler Constr. Co., American National Bank Bldg., Nashville, **$17,749*****paving 1.246 mi. Non-System Hy., W.P.S.O. 292-A, Maury Co., to Inter-State Constr. Co., Independent Life Bldg., Nashville, **$22,188**. Grand total $277,725. Bids May 29, awarded June 2. Noted June 4, C. D.

★ **Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, select material surfacing 9.399 mi. State Hy. 74, F.A.P. 611-C, Lampasas Co., to F. Hall, Waco, **$92,219** est. $100,000***grading, drainage structures, concrete paving 2.216 mi. State Hy. 15, Gregg Co., to Harrison Eng. & Constr. Co., 903 Fairfax Bldg., Kansas City, Mo., **$116,504** est. $125,000*** resectioning, grading, drainage structures, concrete base 8.923 mi. State Hy. 9, San Patricio Co., and 8.815 mi. State Hy. 9, San Patricio Co., to Briggs-Killian Co., Pharr, **$159,451** and **$161,129** respectively, est. $180,000 each. Grand total $529,303. Bids May 20. Noted May 28, C. D.

Texas—G. Gilchrist, state hy. engr., Austin, grout-bound macadam base course with emulsified asphalt surfacing 0.789 mi. State Hy. 1-C, Tarrant Co., to Brown & Root, Inc., 708 Colorado St., Austin, **$125,822** est. $125,000*** grading, drainage structures, gravel surfacing 1.856 mi. State Hy. "F," Ellis Co., to Thomas & Ratliff, Rogers, **$18,454** est. $20,000***grading, drainage structures and sledged stone base course surfacing 4.691 mi. State Hy. "F," Delta Co., to P. B. Keller, 2424 Myrtle St., Dallas, **$53,780** est. $60,000. Grand total $198,056. Bids May 20. New **P.W.A.** Noted May 28, C. D.

★ **Texas**—G. Gilchrist, state hy. engr., Austin, drainage structures, concrete paving, iron ore topsoil shoulders 4.479 mi. State Hys. 64 and 31, F.A.P. 115, reopened, Unit 3, and 316 reopened unit 2, Smith Co., to Gaylord Constr. Co., Houston, **$108,766** est. $110,000***grading, drainage structures, concrete paving 2.277 mi. State Hy. 15, F.A.P. 21, reopened, Unit 2, Gregg Co., to Austin Road Co., 1813 Clarence St., Dallas, **$162,501** est. $170,000***single bituminous on crushed caliche surfacing 15.233 mi. State Hy. 118, F.A.P. 368-D, Jeff Davis Co., to H. B. Zachary, Laredo, **$108,200** est. $110,000***cut-back asphaltic concrete on crushed gravel caliche surfacing 7.196 mi. State Hy. 1, F.A.P. 245-F, Hudspeth Co., to Lee Moor Contg. Co., El Paso, **$78,986** est. $80,000*** double asphalt surfacing 10.99 mi. State Hy. 41, F.A.P. 407, Real Co., to J. C. Ruby, San Marcos, **$58,512** est. $60,000. Grand total $516,964. Bids May 19. Noted May 27, C. D.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, limestone base course paving 5.911 mi. State Hy. "F," W.P.S.O. 869-A, Palo Pinto Co., to E. W. Hable, Corsicana, **$24,748** est. $20,000***grading, drainage structures, gravel ballast base course paving 9.094 mi. State Hy. "F," W.P.S.O. 889-A, Limestone Co., to Cage Bros., Bishop, **$65,484** est. $70,000 ***grading, drainage structures, gravel base course surfacing 6.389 mi. State Hy. "F," W.P.S.O. 870-A, Erath Co., to Cook & Cook, Crockett, **$44,114** est. $45,000. Grand total $134,346. Bids May 19. New **P.W.A.** Noted May 27, C. D.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, gravel surface

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†*Federal Government*

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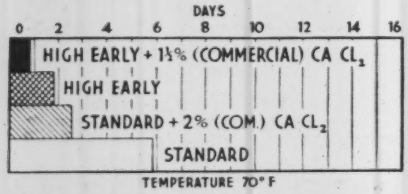

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Streets and Roads (Continued)

course surfacing 4.757 mi. State Hy. "F," Caldwell Co., to H. Page, Norwood Bldg., Austin, **$30,555.** Est. $40,000. New **P.W.A.** Noted Apr. 13, C. D.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, crushed conglomerate gravel base course with double asphalt surface treatment and gravel base course surfacing 6.547 mi. State Hy. "F," Wichita Co., to E. Loyd, Box 1077, Fort Worth, **$30,925.** Est. $40,000. New **P.W.A.** Noted Mar. 25, C. D.

Texas—G. Gilchrist, state hy. engr., Austin, double bituminous surface treating 15.294 mi. State Hy. 159, Austin Co., to Public Constr. Co., Denton, **$26,749.** Est. $30,000. Bids May 20. Noted May 28, C. D.

Utah—State Rd. Comn., Salt Lake City, bituminous material surfacing 11.213 mi. state highway between Pleasant Grove and American Fork Canyon, Utah Co., to W. W. Clyde & Co., Springville, **$42,551.** Est. $44,899. Noted May 28, C. D.

Vermont—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, gravel surfacing and 12x10 ft. reinf.con. box culvert, 0.2 mi. Route 115, Project W.P.S.S. 191-A, Goshen, to Earle & Merry, 42 Burnham Ave., Rutland, **$11,815***** gravel mixed in place surface course with refined tar surfacing 0.6 mi. Route 100, W.P.H. 79-D, Westfield, to D. DeGroot, 9 Depot St., Brandon, **$19,878***** gravel mixed in place surface course paving 0.191 mi. Route Project W.P.S.O. 200-A, Sheldon, to B. A. Simeone, Inc., 107 Century St., Medford, Mass., **$13,288.** Grand total $44,981. Bids May 22, awarded June 6. Noted June 2, C. D.

Virginia—Dpt. Hys., Richmond, **(P. means Project)**, improving Main St. and Rockfish Rd., Route 250, P. WPMH 641, K2N2, in Waynesboro; to R. W. Moore & Co., Staunton, **$9,069 ***** relocation on V. P. I. campus at Blacksburg, Route 8, P. WPMH 727C, Montgomery Co., to L. Bennington, Lynchburg, **$7,159***** 9th Ave. WCL Portsmouth on High St., in Portsmouth, Routes 17 and 58, P. WPMS 1036-F, Portsmouth Co., to J. P. McGuire Constr. Co., Durham, N. C., **$21,502***** 0.22 mi. North NCL Orange, Route 15, P. WPMH 1045-M2, Orange Co., to G. P. Clay, Richmond, **$2,756***** Mallory St., Route 169, P. WPMS 1048-M2, in Phoebus, to J. P. Harvey, Inc., Lynchburg, **$1,651***** 0.7 mi. east ECL Cambria, Route 111, P. WPSS 1128-AB1, Montgomery Co., to G. T. Franklin, Bassett, **$21,769***** constructing approach and overhead crossing A. C. L. R.R., Richmond, 0.56 mi. Route 360, P. WPGH 522-F-B6, Henrico Co., to R. W. Moore & Co., Staunton, **$30,907 ***** bridges over Beaver Creek and O'Possum Creek, from Lynchburg, Route 501, P. FA 688, B1 and 2, Campbell Co., to J. P. Pettyjohn & Co., Lynchburg, **$21,326.** Grand total $116,138. Bids May 28. Rejected bids May 28, improving 5.8 mi. and 3.79 mi. west Barretts Ferry Rd., Charles City Co. Noted June 4, C. D. June 11, E. N.-R.

†Washington—Pub. Rds., Post Office Bldg., Portland, Ore., clearing and partial grading 6 mi. south fork of Stillaquamish Hy., Snohomish Co., to C. V. Wilder, Blaine, $36,049. Bids May 21. Noted May 18, C. D.

Wash., Everett—Snohomish Co. Comn., bituminous surfacing 14.7 mi. West Darrington, Florence Norman Marysville-Tullip Rds., to Washington Asphalt Co., 220 Hudson St., Seattle, **$18,534** est. $18,000*** clearing, grubbing, grading, surfacing Fale Rd. revision, to American Pile Driving Co., City Dock, Everett, **$7,150** est. $6,500. Bids June 8. Noted May 27, C. D.

West Virginia—State Hy. Comn., Charleston, paving 2.022 mi. Grafton St., WPMS 2484, Taylor Co., to R. W. Fimple, Fairmont, **$59,832 ***** hauling stone, P. 201A, Randolph Co., to L. S. Tennant, Ravenswood, **$6,743***** hauling stone, P. 212A, Randolph Co., to E. Phillips, Parsons, **$8,990.** Grand total $75,565. Noted May 21, C. D.—May 28, E. N.-R.

★**Wisconsin** — State Hy. Dpt., Madison, to L. G. Arnold, Inc., Eau Claire, grading, draining, concrete surfacing 0.627 mi. St. Croix Co. **$48,221;** grading, draining 6.553 mi. Spooner-Superior Rd., Douglas Co. **$71,498;** 5.129 mi. same road, Washburn Co. **$28,839***** to A. E. Bounsall, 7400 22nd Ave., Kenosha, concrete surfacing 4.353 mi. Kenosha Co. **$281,639***** to J. Cape & Sons Co. & A. F. Cape, 468 Water St., Racine, 4.183 mi. same road, **$233,844***** to W. Conway, 2105 Jefferson St., Madison, 1.795 mi. Ozaukee Co. **$76,403***** to Streu Constr. Co., Two Rivers, 0.522 mi. Manitowoc Co. **$40,229***** to A. B. Lynch Co., 2221 East Newton Ave., Milwaukee, grading, draining 2.647 mi. St. Croix Co. **$39,250***** to S. J. Groves & Sons Co., 509 Wesley Temple Bldg., Minneapolis, Minn., 2.077 mi. Price Co. **$51,541 ***** to O. Abel, 415 Koltes St. Wausau, 5.152 mi. Lincoln Co. **$47,487;** 0.615 mi. Winnebago Co. **$83,635***** to Fitzpatrick & Lundmark & Co., Cumberland, 6.051 mi. Barron Co. **$75,648***** to W. Lathers, Jr., 216 Virginia Terrace, Madison, 9.81 mi. Columbia Co. **$113,589***** to P. W. Ryan Sons, 303 South 3rd St., Janesville, 6.59 mi. Crawford Co. **$88,600***** to H. A. Raemisch, Dane, grading, draining, gravel surfacing 1.522 mi. Adams Co. **$12,420***** to Tillman Constr. Co., 2229 North 44th St., Milwaukee, gravel surfacing 4.887 mi. Lincoln Co. **$11,159 ***** to J. S. Karlslyst, Inc., 210 North Page St., Stoughton, 6.051 mi. Barron Co. **$12,203***** to Payne & Dolan of Wisconsin, Inc., 1st Natl. Bank Bldg., Milwaukee, bituminous surface course and gravel shoulder surfacing 7.3[illegible] mi. Kenosha Co. **$60,923***** to R. B. Vickery Co., Suamico, grading, draining, structures 8.9[illegible] mi. Marinette Co. **$142,399***** to Genisot & Fo[illegible] Constr. Co., Rhinelander, grading, draining [illegible] ture, gravel surfacing 1.975 mi. Sawy[illegible] **$34,748***** to Federal Paving Corp., 3829 [illegible]th Weil St., Milwaukee, grading, top soil surf[illegible] 1.8 mi. Racine Co. **$11,450***** to J. C. W[illegible] 736 South 31st St., Milwaukee, furn[illegible] placing roadside treatment materials, 1.[illegible] Racine Co. **$2,618.** Grand total $1,56[illegible] Bids June 5. Noted June 9, C.D.

Wisconsin—State Hy. Comn. and County Hy. Committees of Adams and Wood Counties, Wisconsin Rapids, concrete paving 0.362 mi. and 0.198 mi. roads in Wood Co., to Trier[illegible] Constr. Co., Marshfield, **$13,740** and $8[illegible]10 respectively*** grading, structure 3.314 mi. Adams Co., to F. Mashuda, 2213 South [illegible]th St., Milwaukee, **$28,641***** structures and approaches 0.088 mi. Wood Co., to G. P[illegible] Route 1, Menasha, **$14,003.** Grand total $64,[illegible] Noted June 2, C.D.—June 11, E.N.-R.

EARTHWORK, IRRIGATION, DRAINAGE AND WATERWAYS

PROPOSED WORK

†Calif., Santa Barbara—U. S. Eng., 751 South Figueroa St., Los Angeles, making plans dredging in Santa Barbara Harbor. $36,000.

†Mass., Bourne—U. S. Eng., Custom House, Boston, making plans constructing wood pile and steel sheet pile mooring bulkhead at Cape Cod Canal, East Mooring Basin. $150,000.

†Neb., Niobrara—U. S. Eng., City Natl. Bank Bldg., Omaha, constructing additional revetment work in Niobrara River, near here. $130,000. Allotment approved.

N. Y., Montour Falls—Bd. City Trustees, J. Lowman, mayor, plans diverting waters of L'Hommedieu Creek and digging new channel to carry off flood waters. $29,000.

BIDS ASKED

†Arizona—July 3, by Bureau Reclamation, Producer Bldg., Phoenix, constructing spillways at Horse Mesa Dam, Salt River Project, 30 mi. northwest of Mesa, incl. 29,900 cu.yd. open-cut excav., 22,300 cu.yd. excav. in tunnel, 200 cu.yd. excav. of old concrete, etc.

Mich., Keweenaw—June 23, by U. S. Eng., Canal Park, Duluth, Minn., furnishing 18,000 sacks Portland cement, f.o.b. deck of U. S. Derrick boat or scow as specified.

★**†Minn., Red Wing**—U. S. Eng., 615 Commerce Bldg., St. Paul, bids about Sept. 1, constructing Dam 3 in Mississippi River, $3,000,000.

Miss., Gulfport—June 30, by Mayor and Bd. Supervs., Harrison Co., at City Hall, small crafts harbor and recreation park, incl. seawall dredging, buildings, plumbing, electric lights and wiring for City and Harrison Co. Est. $350,000. Shrouds & Bean, Gulfport, archts. Noted Sept. 19, C. D.—Sept. 26, E. N.-R.

†Mo., Clarksville—June 23, by U. S. Eng., U. S. Court House and Custom House, St. Louis, constructing Lock 24, Mississippi River; adv. E. N.-R., June 18. Noted June 1, C. D.—June 4, E. N.-R.

Neb., Genoa—June 27, by Bd. Directors Loup River Public Power Project, completion on union price basis headworks of district, near here. Harza Eng. Co., 205 West Wacker Dr., Chicago, Ill., engrs.

†New Jersey — July 8, by U. S. Eng., 2nd Dist., 39 Whitehall St., New York, dredging 967,000 cu.yd. material from Shrewsbury River extending from Sandy Hook to 600 ft. south of railroad bridge at Highlands; adv. E. N.-R., June 18.

†New York and New Jersey—July 6 (extended date), by U. S. Eng., 2nd Dist., 39 Whitehall St., New York, excavating 54,000 cu.yd. overburden and 415,000 cu.yd. ledge rock in New York and New Jersey Channels, near Berger Point Light, Bayonne, N. J.; adv. E. N.-R., June 18. Noted June 5, C. D.—June 11, E. N.-R.

N. Y., Binghamton—City, City Hall, taking bids sheet steel piling for McDonald Ave. Dike. To exceed $14,000. W.P.A. project. A. A. Calabrisi, procurement officer, W.P.A., Telephone Bldg., Binghamton, will purchase material in near future.

†N. Y., Buffalo—June 24, by U. S. Eng., Buffalo, dredging 244,000 cu.yd. in Erie Harbor, Pa., and 37,800 cu.yd. excavation and 39,800 cu.yd. ledge rock in Oswego Harbor.

†N. Y., New York—July 7, by U. S. Eng., Army Bldg., 39 Whitehall St., New York, removing and satisfactorily disposing of 213,815 cu.yd. ledge rock and 271,965 cu.yd. material of other than ledge rock in Harlem River; adv. E. N.-R., June 18. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

N. Y., Oneonta—See "Contracts Awarded."

†Pennsylvania — June 25, by U. S. Eng., Phila., Pa., excavating 145 cu.yd. plaice measurement of ledge rock, and 40 cu.yd. other material in Delaware River, on Torresdale Range.

†Va., Norfolk—June 24, by U. S. Eng., Norfolk, constructing 531 lin.ft. wood sheet pile bulkheads at Great Bridge.

†Wis., Lynxville—July 7, by U. S. Eng., 615 Commerce Bldg., St. Paul, Minn., constructing Dam 9 in Mississippi River; adv. E. N.-R., June 18.

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†Federal Government

Earthwork, etc. (Continued)

†**Wis., Port Washington**—July 9, by U. S. Eng., Milwaukee, constructing caisson and rubble breakwater, here; adv. E. N.-R., June 18.

Ontario—June 22, by Secretary Dpt. P. Wks., Ottawa, dredging 22,515 cu.yd. sand, silt and clay in Thames River. $18,500. K. M. Cameron, Ottawa, engr.

Ont., Toronto—June 22, by Secretary Dpt. P. Wks., Ottawa, dredging 41,250 cu.yd. sand and silt. $15,500. K. M. Cameron, Ottawa, engr.

Que., Clarke City—June 25, by Secretary Dpt. P. Wks., Ottawa, Ont., wharf repairs, renewing flooring, curbs, new concrete revetment wall, rock excavation, tie rods, etc. $35,000. K. M. Cameron, Ottawa, Ont., engr.

LOW BIDDERS

★†**Wash., Grays Harbor**—U. S. Eng., Seattle, June 11, completing Grays Harbor South Jetty, from Columbia Constr. Co., Bonneville, Ore., $2,799,458. Est. $3,405,528. Bids June 11. Noted May 22, C.D.—May 28, E.N.-R.

CONTRACTS AWARDED

†**Colorado**—Bureau Reclamation, Denver, furnishing fabricated structural steel for Taylor Park Dam, Uncompaghre Reclamation Project, to Midwest Steel & Iron Wks., 25 Larimer St., Denver, $716***gratings, and stair treads, to Hendrick Mfg. Co., Carbondale, Pa. $584*** pipe handrails and fittings, to J. Ryerson & Sons, 2557 West 16th St., Chicago, Ill., $255. Grand total $1,555. Bids Apr. 2.

Kansas—See "Streets and Roads."

★†**Massachusetts**—U. S. Eng., Custom House, Boston, Sect. A, dredging to depth of 25 ft. between Stations 37 plus 00 and 70 plus 00 and to depth of 32 ft. between Stations 70 plus 00 and 490 plus 00, to M. A. Breymann Dredging Co., 17 Battery Pl., New York, $1,347,718; Sect. B, dredging channel 32 ft. and widening canal, also dredging to depth of 17 ft. channel leading into Onset Bay and removal of bridge piers, to Great Lakes Dredge & Dock Co., 17 Battery Pl., New York, $1,723,893. Bids June 2. Noted June 5, C. D.—June 11, E. N.-R.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston, dredging in Provincetown Harbor, Provincetown, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $19,840. Bids June 2, awarded June 5.

★†**Nebraska**—U. S. Eng., Omaha, constructing 28,245 ft. pile dikes, 7,135 ft. revetment and 10,164 ft. abatis in Missouri River at Monona to Tieville Bends, in Decatur, to Woods Bros. Constr. Co., 132 West 13th St., Lincoln, $507,398 est. $507,398; 8,335 ft. piles dikes, 12,000 ft. revetment and 3,190 ft. abatis in Missouri River, at Black Bird to Decatur Bends, in Decatur, to W. P. McGeorge, Pine Bluff, Ark., $280,505. Bids June 5. Noted June 1, C.D.

†**Nev., Boulder City**—Bureau Reclamation, Denver, Colo., furnishing structural steel supports for lower Arizona and lower Nevada tunnels for Boulder Dam, to Hansell Elcock Co., South Archer and South Normal Sts., Chicago, Ill., $16,000***handrails and fittings, to Crane-O'Fallon Co., 1631 15th St., Denver, Colo., $6,357***grating, to Blaw-Knox, Blawnox Bldg., Pittsburgh, Pa., $1,383. Grand total $35,740. Bids Apr. 6. Noted Mar. 17, C.D.—Mar. 19, E.N.-R.

N. J., Bayonne—See "Unclassified."

N. Y., Oneonta—Bd. Supervs. Otsego Co., Cooperstown, constructing stone walls 6½ ft. high and pouring concrete bottom in Oneonta Creek, near here, relief labor. $57,103. W.P.A. A. Calabrisi, Telephone Bldg., Binghamton, procurement officer, W.P.A., will purchase materials.

Tex., Palacios—Palacios Seawall Comn., c/o G. A. Harrison, chn., seawall extension, 18- to 36-in. concrete storm sewer, timber piling, etc., earthwork excav., to A. N. Evans, Columbus, $15,618. Bids May 29. Award subject to P.W.A. approval. Noted May 18, C. D.—May 7, E. N.-R.

Ont., Port Dover — Dpt. P. Wks., Ottawa, dredging, to C. S. Boone Dredging & Constr. Co. Ltd., 330 Bay St., Toronto, $27,000.

UNCLASSIFIED

PROPOSED WORK

★**Calif., San Francisco**—LANDSCAPE WORK —City Park Comn., Park Lodge, Golden Gate Park, Stanyan and Fell Sts., will supervise stocking of nursery in Balboa Park to provide planting for San Francisco-Bay Bridge Exposition, for San Francisco Bay Exposition, Inc., W. P. Day, dir. of works of exposition, Kohl Bldg. $498,000. Work is to be financed with Federal funds. W.P.A. allotment.

★**Calif., San Francisco**—SUBWAY SYSTEM —City and San Francisco Co., E. G. Cahill, mgr. Public Utilities Comn., City Hall, plans to vote $52,700,000 bonds to finance 8½ mi. rapid transit subway system. Proposal sponsored by A. J. Rossi, mayor. Public Utilities Comn. has approved recommendation of its manager on this proposal and same has received endorsement of A. J. Rossi, mayor. The following routes contemplated, 1—Market St. from Church to Fremont Sts. with extension under Fremont St. to San Francisco-Oakland Bay Bridge Terminal; 2—Mission St. from Market St. and Van Ness Ave. to 24th St., thence under old S.P. R.R. right-of-way to Dolores and 27th Sts. where track would come to surface and go through Bernal Cut; 3—Geary St. from Hamilton Sq. to Market St. and west on Montgomery St. to Columbus Ave. near Washington St. Noted Apr. 9, C.D.—Apr. 16, E.N.-R.

★**Kansas**—PIPE LINE—White Eagle Oil Co., Federal Reserve Bank Bldg., Kansas City, Mo., soon takes bids pipe line and distributing center, from Augusta to Kansas City, involving 1,100,000 ft. pipe. $1,500,000. R. R. Irvin, Federal Reserve Bank Bldg., Kansas City, Mo., engr.

†**Mich., Leland Harbor**—PIER, etc.—U. S. Eng., Milwaukee, Wis., making plans constructing 370 ft. north pile pier, 440 ft. south pile pier, removing 237 ft. old north and south piers, and dredging in Leland Harbor.

★**Mont., Great Falls** — PIPE LINE, etc.— Home Oil & Refining Co., plans 100 mi. 6 in. pipe line between Cut Bank and Great Falls, 20 mi. gathering lines, complete new tank farm and rail terminal at Cut Bank, terminal at Great Falls, constructing two pumping stations between Cut Bank and Conrad, and two pumping stations between Conrad and Great Falls, constructing private telephone system serving entire pipe line. $675,000. Private plans.

Neb., Columbus—DISTRIBUTION LINE—Loup River Public Power Dist., C. B. Friske, pres., 2307 13th St., Columbus, soon takes bids constructing 305 mi. 600 volt electric distribution lines and 49 mi. 12,000 volt transmission lines with substations, transformers, etc. $400,000. P.W.A. project.

†**C. Z., Balboa**—WHARF—Yards & Docks, Navy Dpt., Wash., D. C., indefinitely postponed bids to have been opened June 10, constructing wharf and road, Spec. 7820. Noted May 27, C.D.

BIDS ASKED

†**D. C., Bolling Field**—WEIR—June 25, by District Comrs., District Bldg., Wash., D. C., constructing relief weir at Bolling Field; adv. E. N.-R., June 18.

†**Mich., Leland Harbor**—PIER, etc.—July 10, by U. S. Eng., Milwaukee, Wis., constructing 810 ft. pile pier and removing 237 ft. old piers at Leland Harbor; adv. E. N.-R., June 18. Noted June 10, C. D.—June 18, E. N.-R.

Miss., Gulfport—RECREATION PARK—See "Earthwork, Irrigation, Drainage and Waterways."

Mont., Great Falls—OIL PIPE LINE—See "Contracts Awarded."

N. Y., Laurelton—SHELTER and BOATHOUSE—See "Contracts Awarded."

N. Y., Solvay—FAIRGROUNDS—See "Contracts Awarded."

N. Y., Woodlawn—SUBDIVISION DEVELOPMENT—Stony Point Land Co., 19 South Division St., Buffalo, and taking bids grading, paving, curbing, etc., for subdivision development. To exceed $23,000. R. Nussbaumer & Clarke, Inc., 327 Franklin St., Buffalo, engrs.

Oregon—RADIO SYSTEM—June 27, by State Hy. Comn., Portland, statewide shortwave radio system. $57,000 of which P.W.A. expects to give $30,888.

Pa., Erie — DOCK IMPROVEMENTS — See "Contracts Awarded."

Pa., York—FIELD HOUSE, etc.—June 25, by D. N. Crider, secy., c/o School Dist., construction concrete, steel field house at Meadowbrook Playground; furnishing 50 tons or more, bituminous concrete. To exceed $23,000. H. R. Lenker, 25 North Duke St., engr.

Ont., Ottawa—PIER—See "Waterworks."

CONTRACTS AWARDED

Calif., Hollywood—SWIMMING POOL—J. M. Schenck, Hollywood Blvd. and Fuller Ave., swimming pool, recreating hall and bathing pavilion at Hollywood Blvd. and Fuller Ave., to Wm. Simpson Constr. Co., Architects Bldg., Los Angeles, about $50,000. Walker & Eisen, 708 Pacific Commerce Bldg., Los Angeles, archt.

†**Mass., Scituate** — RADIO ANTENNA SUPPORTS, etc.—District P. Wks. Officer, Navy Yard, Boston, radio antenna supports, etc., at Naval Direction Finder Station, Spec. 8046, to W. W. Staples, Attleboro Falls Station, North Attleboro, Items 2 and 3, $1,920; repairing watermains, Spec. 8221, to Johns-Manville Sales Corp., 75 Federal St., Boston. Bids May 14. Noted May 22, C. D.

★**Mont., Great Falls**—OIL PIPE LINE— Home Oil & Refining Co., constructing 100 mi. 6 in. oil pipe line from Cut Bank to Shelby and south to Conrad and Great Falls, day labor. Company expects to start work in near future. $675,000.

★**N. J., Bayonne**—TERMINAL—City Comrs. constructing industrial terminal, to Standard Dredging Co., 80 Broad St., New York, and J. Rich Steers, Inc., 17 Battery Pl., New York, $3,548,500. Contract awarded subject. P.W.A. approval. Noted Dec. 12, C. D.—Dec. 19, E. N.-R.

N. Y., Brooklyn—ATHLETIC FIELD, etc.— Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing athletic field and playground, incl. drainage system, Parkside Ave. and Parade

†*Federal Government*

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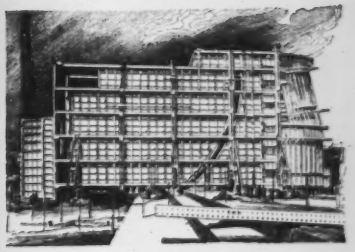
BLAW-KNOX

Construction Equipment



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Unclassified (Continued)

Pl., relief labor. $37,000. **W.P.A.** A. Embury, 2nd, c/o owner, engr. and archt. Noted May 8, C.D.—May 14, E.N.-R.

N. Y., Flushing—CADDY HOUSE, etc.—Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing caddy house and golf improvements at Willets Point Blvd. and 206th St.; on Hempstead Turnpike and 168th St., and at Park Lane South, Richmond Hill. To exceed $30,000. Owner builds. A. Embury, 2nd., c/o owner, archt.

★ **N. Y., Flushing**—FAIR—Dpt. Parks, Arsenal Bldg., Central Park, New York, grading, filling contract for Flushing Meadow Park, site for George Washington Inaugural Fair, to A. A. Johnson Corp., and to Necaro Co., 2928 Hunter Ave., Long Island City, $2,186,185. Bids May 27. Noted May 28, C. D.—May 14, E. N.-R.

N. Y., Laurelton—SHELTER and BOATHOUSE — Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing 1 story, 62x105 ft. shelter and boathouse, Brookville Rd., relief labor. $38,000. **W.P.A.** A. Embury, 2nd, c/o owner, archt.

N. Y., Solvay—FAIRGROUNDS—New York State Fair Grounds, Denison Bldg., Syracuse, improving New York State Fair Grounds, incl. grading, planting, seeding, landscaping, etc., relief labor. $25,000. **W.P.A.** G. L. Noble, Old Post Office Bldg., Syracuse, procurement officer. W.P.A. will purchase materials.

Pa., Erie — DOCK IMPROVEMENTS—Erie Sand & Gravel Co., foot of Sassafras St., alterations and improvements to docking facilities at company's plant, foot of Sassafras St., own forces and separate contracts for materials. Est., $25,000. Private plans. Noted June 1, C. D.—June 4, E. N.-R.

MATERIALS AND EQUIPMENT

PROPOSED WORK

†SEWAGE PUMP—**San Rafael, Calif.**—Con. Q.M., Hamilton Field, soon takes bids furnishing 500 g.p.m. vertical sewage pump, powered by 15 hp. gasoline engine in sewage pumping plant, at Hamilton Field Air Base, near here.

TRENCHING MACHINE—**Burbank, Calif.**—City Council authorized H. I. Stites, engr., City Hall, to advertise for bids for purchase of 1 trenching machine 10 ft. depth cutting capacity. $2,000.

AMMONIUM SULPHATE—**Chicago, Ill.**—City, Dpt. P. Wks., City Hall, received no bids June 9, furnishing ammonium sulphate. Will readvertise. Noted June 5, C.D.

†DRAGLINE EXCAVATORS, etc. — **Kansas City, Mo.**—U. S. Eng., 232 Mfg. Exch. Bldg., Kansas City, soon takes bids 2 dragline excavators, gasoline driven, 60 ft. boom, $40,000.

STEEL TANKS—**Buffalo, N. Y.**—Virginia-Delaware Corp., 15 Genesee St., Buffalo, will purchase 500 or 1,000 gal. steel storage tanks for service station to be built at 455 Delaware Ave.. To exceed $1,000. Bley & Lyman, 505 Delaware Ave., engrs.

WINCH, etc.—**Westfield, N. Y.**—E. F. Allen, 161 West Main St., in market soon for winch, rod pulling machine, multiple power pumping unit, gas engines, and other equipment for pumping oil wells for use in Warren Co., Pa.

ROAD EQUIPMENT, etc. — **White Plains, N. Y.**— Bd. Supervs. Westchester Co., Court House, White Plains, will purchase new equipment to replace that used on W.P.A. projects and worn out. $50,000.

CONCRETE MIXING MACHINES — **Glace Bay, N. S.**—Municipality, John MacKensie, engr., interested in prices of concrete mixing machines.

BIDS ASKED

ASPHALT CONCRETE SURFACING MATERIALS—**Berkeley, Calif.**—F. Turner, city clk., taking bids 500 tons Type B and C, asphaltic concrete surfacing materials.

†MATTRESS LUMBER—**Iowa**—June 23, by U. S. Eng., City Natl. Bank Bldg., Omaha, Neb., 1,000,000 ft. B.M. mattress lumber, and 5,000 round wood piles, f.o.b. Mondamin, both in Missouri River.

★ TURBINE, etc.—**Kansas City, Kan.**—July 8, by D. T. McCombs, mayor, City Hall, furnishing, placing one 30,000 kw. turbine and one condenser of 40,000 sq.ft. area. $500,000. Burns & McDonnell, 107 West Linwood Blvd., Kansas City, Mo., engrs.

†GENERATING SETS and PUMP ENGINE—**St. Paul, Minn.**—June 24 (extended date) by U. S. Eng., 615 Commerce St., St. Paul, 2 or 4 generating sets and 1 or 2 dredging pump engines all full Diesel type; adv. E. N.-R., June 18. Noted May 22, C. D.—May 28, E. N.-R.

†PIPE LINE DREDGE—**St. Paul, Minn.**—June 24 (extended date) by U. S. Eng., 615 Commerce Bldg., St. Paul, constructing one 20 in. pipe line dredge, self-propelled; adv. E. N.-R., June 18. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

†PINE TIMBERS—**Vicksburg, Miss.**—July 6, by U. S. Eng., Post Office Box 667, 16,534 ft. B.M. dense long leaf southern yellow pine timbers, f.o.b. Vicksburg.

SHOVEL—**Valley Park, Mo.**—J. Mondert, Vance Rd., in market for ¾ to 1 cu.yd. shovel.

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★ †RIP RAP—**Fort Peck, Mont.**—July [illegible] by U. S. Eng., Fort Peck, furnishing [illegible] A stone 3-7 tons in size for each piece with estimated quantity of 229,000 solid cu.yd.; Class B stone, 1-5 tons in size with estimated quantity of 308,000 solid cu.yd.; Class [illegible] (spalls) 25-150 lb. each, quantity of 2[illegible],000 solid cu.yd., for Fort Peck Dam, f.o.b. [illegible]ota, $1,500,000.

†LUMBER—**Omaha, Neb.**—June 23, by U. S. Eng., 819 City Natl. Bank Bldg., 1,000,000 bd. ft. 1x4 mattress lumber, for river improvement work. $30,000.

STEEL SHEETS—**New York, N. Y.**—June 22, by Dpt. Purchase, Municipal Bldg., furnishing, delivering steel sheets to various departments of the government of the City of New York.

CAST IRON PIPE—**Oil City, Pa.**—June 22, by C. S. Hetrick, city clk., furnishing for 1 year as required, 4- to 25-in. c.i. pipe, all weights; 4- to 24-in. wrought iron pipe, all weights; 4- to 24-in. flanged cast iron pipe, all weights, special castings and fittings. To exceed $1,000. B. B. Webber, City Hall, city engr.

MOTOR STREET GRADER—**Taylor, Pa.**—June 26, by Borough Council, J. Powell, secy., gasoline operated power street grader. To exceed $1,000.

ROAD ROLLER, etc.—**Wilkes-Barre, Pa.**—June 23, by W. W. Multer, controller Luzerne Co., furnishing one 10 ton road roller, 1 power road grader, for Luzerne Co. Comrs. To exceed $1,000.

BITUMINOUS CONCRETE—**York, Pa.**—See "Unclassified."

ROAD ROLLER, etc.—**West York, Pa.**—June 22, by Borough of West York, P. R. Kraber, secy., Reliance Fire House, one 10 ton road roller and scarifier. To exceed $1,000.

†CONCRETE AGGREGATES—**Knoxville, Tenn.**—June 24, Tennessee Valley Authority, Knoxville, furnishing 22,000 tons sand for concrete aggregates for Chickamauga Dam and appurtenant works. C. H. Garity, dir. Purchases.

STRUCTURAL STEEL—**Charleston, W. Va.**—June 23, by M. R. Mathews, city mgr., City Building, fabrication, delivery structural steel for Span "F," South Side Bridge; adv. E. N.-R. June 18.

TURBINE PUMP, etc.—**Watertown, Wis.**—June 23, by Bd. Water Comn., furnishing deep well turbine pump, 1,750 r.p.m. alternate 1,150 r.p.m. 1,500 g.p.m. Separate bids on orifice flow meter, fittings, and valves.

CONTRACTS AWARDED

SEAMLESS STEEL PIPE—**California**—Shell Oil Co., 1008 West 6th St., Los Angeles, furnishing various amounts seamless steel pipe, to Columbia Steel Co., 2087 East Slauson Ave., Los Angeles, to Republic Steel Co., 60 West 5th St., Los Angeles, and to Jones & Laughlin Steel Corp., 727 West 7th St., Los Angeles*** electric welded steel pipe, to A. O. Smith Corp., 152 South Arden Blvd. and to Republic Steel Corp., 601 West 5th St., both Los Angeles. Total tonnage of all above is 25,000 tons, all above for use in construction pipe line.

CONCRETE PLACER—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 1 pneumatic concrete placer to be horizontal cylindrical shell, railroad car wheel mounted, worm type, complete with electric motor, starter, etc., Spec. 1978, to Garlinghouse Bros., 2416 East 16th St., $3,480. Bids May 28, awarded June 2.

†COPPER STRIPS, etc.—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., copper strips and steel plates, Spec. 666, to E. Brown & Co., 300 East 9th St., $2,277***9,000 gal. concrete sealing solution, Spec. 665, Lot 1, to Sherwin Williams Co., 3170 East Pico Blvd., $1,650***Lot 2, to W. M. Baldwin, Pasadena, $870. Grand total $4,797. Bids May 22.

GATE VALVES—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Broadway, 100 4 in. 175# screw end, 400 six in., 175# hub end, 100 four in. 175# screw end, 150 eight in. 175# hub end and 25 eight in. 350# screw end gate valves, to Grinnell Co., 520 Mateo St., $10,437; furnishing 3 four in., 225# flange end, 38 four in. 400# flange end, 2 six in. 225# flange end, 2 six in. 400# flange end, 3 eight in. 225# flange end, 3 eight in. 225# flange end and 41 eight in. 400# flange end gate valves, to Crane Co., 321 East 3rd St., $3,401, all foregoing Spec. X-16. Bids May 7. Rejected bids May 7, furnishing 2 six in. 400# hub end and one 8 in. 400# hub end gate valves. Noted Apr. 29, C. D.

GUY CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing 95,000 ft. standard 1/4 in., 85,000 ft. 5/16 in. standard, and 35,000 ft. 3/8 in. high strength galvanized steel guy cable, Spec. 1981, to Goddard-Jackson Co., 1400 Santa Fe Ave., $2,760. Bids June 4, awarded June 9. Noted June 3, C.D.

SKIP LOADERS—**Los Angeles, Calif.**—A. J. Holm, city purch. agt., City Hall, three Hough of equal hydraulic skip loaders, mounted on McCormick-Deering Model 1-30 tractors, Spec. 3503, to J. D. Adams Co., 1202 Mateo St., $6,086. Bids May 11, awarded June 4. Noted May 20, C.D.

†*Federal Government*

Materials, etc. (Continued)

TRACTORS—**Los Angeles, Calif.**—H. E. Russell purch. agt. Los Angeles Co., 524 South Spring St., 2 tractors crawler type, diesel or oil burning, 30 HPDB, Spec. 1207, to Smith-Booth-Usher Co., 2001 Santa Fe Ave., $4,900. Bids Apr. 20.

★WATER PIPE and FITTINGS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, furnishing welded steel water pipe and fittings (1) pipe, 36 in. diam., 30 ft. sections; 9,000 ft. ¼ in. wall, 30,410 ft. ¼ in. wall, 7,850 ft. 7/16 in. wall, 15,440 ft. 15/32 in. wall, 11,100 ft. 17/32 in. wall, 7,800 ft. 9/16 in. wall (2) pipe, 36 in. diam., 30 ft. sections, 30 ft. ¼ in. wall, 120 ft. 7/16 in. wall, 210 ft. 15/32 in. wall, 390 ft. ½ in. wall, 150 ft. 17/32 in. wall, 90 ft. 9/16 in. wall (3) 36 each short 36x20 in. reducers (4) 36 each long 36x20 in. reducers, Spec. X-17, all f.o.b. contractor's plant, to Emsco Derrick & Equipment Co., 6811 South Alameda St., $559,147. Bids May 25, awarded June 4. Noted June 2, C.D.

PIG LEAD—**Oakland, Calif.**—J. H. Kimball, secy., East Bay Municipal Utility Dist., 512 16th St., Oakland, furnishing 50 tons pig lead under Informal Proposal 745, to Bunker-Hill and Sullivan Mining & Concentrating Co., Crocker Bldg., San Francisco, $4,700. Bids May 27. Noted June 9, C.D.

†DREDGE PONTOON PIPE—**San Francisco, Calif.**—U. S. Eng., Custom House, San Francisco, furnishing 616 lin.ft. 27 in. steel plate dredge pontoon pipe, to Pacific Coast Eng. Co., foot 14th St., Oakland, $15.25 per ft. Noted May 8, C. D.

†SHORE PIPE—**San Francisco, Calif.**—U. S. Eng., Custom House, furnishing sixty-three 16 ft. lengths shore pipe for use at Yerba Buena Shoals, to Pacific Coast Eng. Co., Wharf and Maritime Sts., Oakland, $47 each, total $2,961. Bids May 2. Noted May 8, C. D.

GATE VALVES—**Chicago, Ill.**—City, City Hall, to Koppers Constr. Co., Fort Wayne, Ind., 42 in. gate valves for Springfield Avenue Pumping Station at $1,293; 18 in. at $230; and 16 in. at $170. Bids May 27, awarded May 27. Noted June 2, C.D.

TRAFFIC SIGNAL EQUIPMENT—**Chicago, Ill.**—City, City Hall, furnishing, delivering traffic signals control equipment, to General Electric Co., 230 South Clark St., Nos. (1) $254 each (2) $274 each (3) $264 each (4) $264 each (5) $404 each (6) $168 each (7) $314 each. Bids May 26, awarded May 27. Noted June 2, C. D.—May 21, E. N.-R.

SIGN POSTS—**Ames, Ia.**—State Hy. Comn., 4,000 4x4 in. x 8 ft. and 1,000 4x4 in. x 10 ft. creosoted sign posts, to Central State Bridge Supply Co., Fort Madison, $2,710. Awarded June 9.

CAST IRON FRAMES and COVERS—**Boston, Mass.**—City, Supply Dpt., D. F. Doherty, supt., City Hall Annex, 150,000 lb. c.i. frames and covers, etc., to Sewer Dpt., to E. L. Le Baron Fdry. Co., Commercial Yard, Brockton, $3,600. Bids May 19, awarded June 2.

AIR COMPRESSOR, etc.—**Minneapolis, Minn.**—City, furnishing one portable air compressor, for Water Works Dpt., to Minneapolis Iron Store Co., 512 Washington Ave. N., $2,325*** two motor graders for Equipment Dpt., to W. H. Ziegler Co., 2331 University Ave. S.E., $9,588 ***two ¾ ton trucks, to Anderson Motor Co., 120 East Lake St., $1,434***seven 3½ to 5 ton dump trucks, to Motor Power Equipment Co., 2303 Highland Ford Parkway, St. Paul, $23,941. Grand total $37,288. Bids May 20. Noted May 15. C.D.

CHLORINATING MACHINE, etc.—**Minneapolis, Minn.**—City, one chlorinating machine and one ammoniator with appurtenances for swimming pool in public school, to W. S. Scaife & Sons Co., 100 Metropolitan Life Bldg., $2,620. Bids Apr. 30. Noted Apr. 23, C. D.

SPECIAL CASTINGS—**Minneapolis, Minn.**—City, 22½ tons special castings for Waterworks Dpt., to American Brake Shoe & Fdry. Co., 317 37th Ave. N.E., $2,922. Bids May 14. Noted May 27, C. D.—June 4, E. N.-R.

TRUCK, etc.—**Minneapolis, Minn.**—City, furnishing 2 ton truck, to Motor Power Equipment Co., 2303 Highland Ford Pkwy., St. Paul, $1,290; two 72 tons reinforcing steel, to Hustad Co., 529 South 7th St., $3,916. Bids May 11. Noted May 6, C. D.

PUMPER—**Moorhead, Minn.**—City, furnishing fire pumper, to Buffalo Fire Appliance Corp., 44 Central Ave., Buffalo, N. Y., $10,893. Bids May 19. Noted May 21, C. D.

AUTOMOBILE LICENSE PLATES—**Jackson, Miss.**—C. N. Craig, state auditor, State Tax Comn., automobile license plates, for use by state during year of 1937, 426,000 plain metal tags, to Columbus Marble Wks., Columbus, $14,728. Bids June 4, awarded June 5.

STRUCTURAL STEEL SPAN—**Jackson, Miss.**—State Hy. Comn., E. W. Kenna, dir., furnishing f.o.b. Guide, 1 unit structural steel span for use on Jackson-Meridian Hy., Grade Crossing Project WPGH 163, Part 2, Rankin Co., to Jones & Laughlin Steel Corp., Industrial Canal, New Orleans, La., $3,394. Est. $1,100. Bids May 12, awarded May 25.

†BRONZE CASTINGS—**Kansas City, Mo.**—U. S. Eng., 707 Postal Telegraph Bldg., furnishing 25,000 lb. manganese bronze castings to be used for emergency gates, at Fort Peck Tunnels, to Columbia Bronze Corp., Freeport, N. Y., $6,139. Est. $8,000. Bids June 6. Noted June 9, C.D.

†Federal Government

STONE—**Middlesex, N. J.**—Boro, to Bound Brook Crushed Stone Co., Chimney Rock Rd., 460 cu.yd. 2½ in crushed stone, $1,090; 190 cu.yd. ¾ in., $471; 40 cu.yd. ¾ in., $105; 360 cu.yd. 2½ in. unscreened road stone, $853; 140 cu.yd. ¾ in., $367, total $2,886, for constructing Harris Ave. and State Hy. 28. **W.P.A.** Awarded June 3.

PIPE—**Newark, N. J.**—Public Service Corp. of New Jersey, 1,000 tons 4- to 8-in. c.i. pipe for water lines, to R. D. Wood & Co., Florence, and Warren Fdry. & Pipe Corp., Phillipsburg.

STONE, etc.—**New Brunswick, N. J.**—Freeholders Middlesex Co., to Koppers Products Co., Koppers Bldg., Pittsburgh, Pa., 179,094 gal. Tar X 9.4c. per gal.; 150,000 gafl. Tar A 9.6c.; 140,440 Tar B 9.675c. per gal.***to Bituminous Products Co., Kingston, 485 tons Type T stone $8.50 ton***to Tar Asphalt Service, Inc., Silver Lake Ave., New Brunswick, 39,260 gal. Type AE. 9.9c. per gal.***to Utility Constr. Co., 84 Patterson Ave., New Brunswick, 375 tons FABC-1 at $12.90 per ton***to Shelt Co., 739 Baldwin St., Elmira, N. Y., 6 in. perforated corrugated metal pipe, 43c. per lin.ft.; 8 in. 48c.; 8 in. pure iron 82c.; 10 in. pure iron $1; 12 in. $1.18. Bids May 25. Noted May 20, C.D.

STONE—**Woodbridge, N. J.**—Town, Town Hall, 500 net tons 1½ in. crushed stone for constructing St. Georges Ave. and Freeman St., to Raritan Mercantile Corp., Front St., Perth Amboy.

CRUSHED STONE—**Albany, N. Y.**—Dpt. P. Wks., Albany, 700 tons crushed stone delivered to Hy. 1305, Cattaraugus Co. (near Salamanca), and 2,200 tons delivered Hys. 8334 and 8344, in Chautauqua Co. (near Van Buren), to Genesee Stone Products Corp., Box 98, Batavia, $1,540 and $4,620 respectively. Noted May 27, C.D.—June E, E.N.-R.

CRUSHED STONE—**Albany, N. Y.**—J. E. Sheary, ch. aud., c/o Dpt. P. Wks., Albany, to Catskill Mountain Corp., 47 Mamaroneck Ave., White Plains, 700 tons crushed stone, delivery Hy. 8325, near Downsville, $2.05 per ton, total $2,460; 700 tons, delivery Hy. 3459, near Dunraven, Delaware Co., $2.20 per ton, total $1,540; 1,500 tons, delivery Hy. 8017, $2 per ton, total $3,000***to Britton Stone & Supply Corp., Rush, 400 tons at $1.74 per ton, total $696***to Law Bros. Contg. Corp., 200 North Main St., Herkimer, 340 tons, delivery Copenhagen, $1.90 per ton, total $646. Grand total $8,342.

LIMESTONE, etc.—**Cortland, N. Y.**—A. Calabrisi, Telephone Bldg., Binghamton, procurement officer, W.P.A., 3,600 tons limestone and 68 tons limestone dust for street work, in Cortland, for City, to General Crushed Stone Co., Union Bldg., Syracuse, $4,986.

PUMP TRUCKS—**Rochester, N. Y.**—City, City Hall, 2 pump trucks for City Fire Dpt., to American LaFrance Co., 100 East LaFrance St., Elmira, $26,068.

ASPHALT BINDER, etc.—**Syracuse, N. Y.**—Bd. Contr. & Supply, City Hall, A. Smingler, purch. agt., 880 tons asphalt binder and 450 gal. liquid asphalt cement, for use in reconstructing streets, to Syracuse Paving & Contg. Co., Union Bldg., $10,485.

GAS ROLLERS—**Raleigh, N. C.**—Div. Purchase & Contr., four 5 ton gas rollers, to North Carolina Equipment Co., 3116 Hillsboro St., $2,180 each. Est. $8,720. Bids June 4. Noted May 29, C. D.

FIRE HOSE—**Johnstown, Pa.**—F. I. Connor, city purch. agt., City Hall, 1,000 ft. fire hose, to Goodrich Silvertown Stores, Johnstown, 80c. per foot. Est. $1,000. Bids June 2, awarded June 3.

BALLAST, etc.—**Boyertown, Pa.**—Borough, 2,000 tons ballast and screening, to Boyertown Stone Service Co., $1 per ton; 800 tons bituminous concrete, to Windsor Service Co., Windsor, $4.90 per ton.

DRIVEN DEEP WELL—**Camas, Wash.**—City Water Dpt., City Hall, electrically driven deep well pump with capacity 800 gal. min., to Gordon & Finkbeiner, 112 Southwest Pine St., Portland, Ore., $2,357. Noted May 22, C. D.

GRADER, etc.—**Madison, Wis.**—Dane Co., furnishing one motor patrol grader, to Badger Rd. Equipment Co., 321 North 25th St., Milwaukee, $3,879. Bids May 19. Rejected bids May 19, bituminous distributor and truck chassis. Noted May 15, C. D.

TIMBER—**Madison, Wis.**—Dane Co., 1 carload treated timber, to Reilly Tar & Chemical Co., 2500 South Damen Ave., Chicago, Ill., $1,370 ***2,000 cu.yd. pea gravel and grading in town Vienna, to H. A. Raemisch, Dane, $1.00 per yd. and $1,968 respectively. Bids Mar. 28. Noted Apr. 24, C. D.

†ADAMANT BASE COAT, etc.—**Milwaukee, Wis.**—Veterans Administration, 300 tons adamant base coat on metal lath and 2 tons gaging plaster, to W. F. Luebke Co., 148 East Anderson Ave., $9.90 per ton and $15 per ton respectively. Bids June 3, awarded June 3.

LUMBER—**Milwaukee, Wis.**—National Park Service, furnishing lumber, sash, doors, for Devils Lake State Park, to Deppe Lumber Co., Baraboo, $2,119***lumber and building material for Fox River Park, to Wilbur Lumber Co., Silver Lake, $371. Awarded June 9.

†PAVEMENT BREAKERS, etc.—**Milwaukee, Wis.**—U. S. Forest Service, furnishing 2 pavement breakers, to Boehik Equipment Co., 2404 West Clybourn St., $467; telephones, to Kellog Switchboard & Supply Co., 1066 West Adams St., Chicago, Ill., $540. Awarded June 4.

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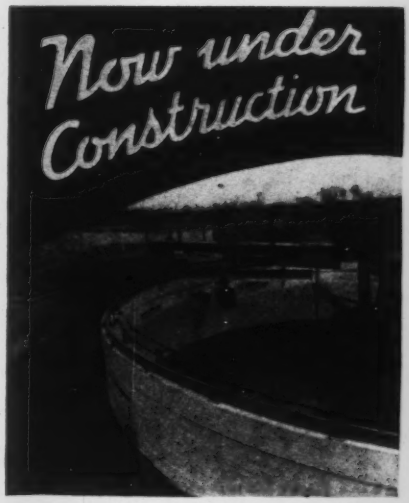

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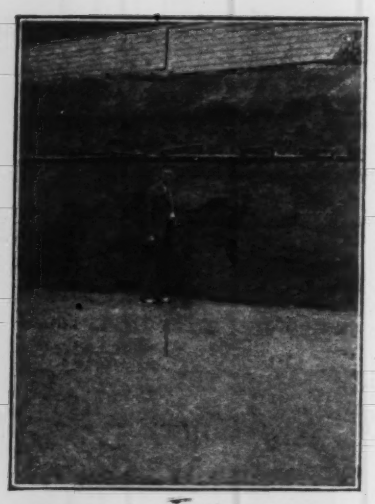

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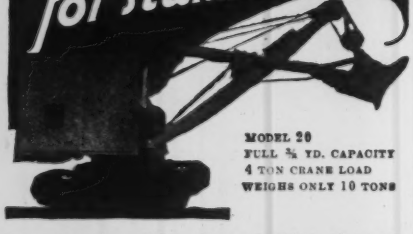

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⅜ yd. (Truck Shovel)	10
¾ yd. (Tractor Shovel)	¾ Circle
½ yd.	30
⅝ yd.	38
¾ yd.	45
⅞ yd.	52
1 yd.	62
1¼ yd.	65

BAY CITY SHOVELS Inc.
BAY CITY, MICH.

Materials, etc. (Continued)

PIPE, etc.—Milwaukee, Wis.—City, to U. S. Fdry. & Pipe Co., 122 South Michigan Ave., Chicago, Ill., furnishing 1,005 tons c.i. water-pipe, 4 in. at $48.30 per ton, 8, 12 and 16 in. $45.30 per ton, and 68 tons special castings $115 per ton. Bids June 4.

†REINFORCING STEEL—Milwaukee, Wis.—U. S. Engineers, Milwaukee, furnishing 122,931 lb. reinforcing steel, to W. H. Pipkorn Co., 1548 West Bruce St., $2,393. Bids May 25, awarded June 5.

PIPE—Oshkosh, Wis.—City, furnishing 8- to 12-in. c.i. pipe, to J. B. Clow & Sons, 201 North Talman Ave., Chicago, Ill. Est. $8,000.

SCREENINGS—Oshkosh, Wis.—City, furnishing 3,000 cu.yd. stone screenings, to Lutz Co. & Oshkosh Stone Co., Oshkosh, $1.75 per yd. Bids June 1. Noted May 26, C.D.

ROAD OIL, etc.—London, Ont.—City Clerk, supplying road oil, to Imperial Oil Ltd., 641 York St., medium 10½c. per gal., light 8½c. per gal.***portland cement, to Woolatt Fuel & Supply Co. Ltd., 479 Grey St., at $2.31 per bbl. ***iron castings, to Geo. White & Sons Co. Ltd., Cabell St., at $2.46 per cwt.***sewer pipe and land tile, to Woolatt Fuel & Supply Co. Ltd., Capp Bros. Ltd., 85 York St., and Geo. F. Mills & Sons Ltd., 280 Maitland St., at 18c. per ft.***vitr. sewer pipe, to Capp Bros. Ltd., 85 York St., and G. F. Mills & Sons Ltd., 280 Maitland St.***concrete sewer pipe, to Concrete Pipe Ltd., London. Noted May 12, C. D.—May 14, E. N.-R.

SNOW PLOW EQUIPMENT—Ottawa, Ont.—Secretary Bd. Control, supplying Walter motor flusher snow plow equipment, to J. S. Innes Ltd., Toronto, $13,800. Est. $14,500. Noted Feb. 26, C. D.

ROAD OIL—Peterborough, Ont.—City, supplying medium asphalt road oil, to The Imperial Oil Ltd., Parks St. Noted May 25, C. D.—May 28, E. N.-R.

FOREIGN

Austria, Vienna—Metalle Und Erz, A.G., Kantgasse 3, in market for considerable quantity of zinc concentrates of 50-60 per cent content and lead concentrates of 60-80 per cent content, prices to be quoted c.i.f. Trieste. Cables "Erzmetall" Vienna.

England—July 7, by Borough Electrical Engineer, 40 Lune St., **Preston,** supplying house service type electricity meters, domestic water heating apparatus and breakfast cookers*** June 29, by Town Clerk, Saltergate St., **Lincoln,** supplying bituminous spraying machines, 300 gal. boiling capacity with scythe sprayer, instantaneous release shafts and lifting apparatus for hoisting barrels on to machine***Southport City plans by S. N. Cooke, constructing clinic building***P. D. Hepworth, c/o Municipal Council, **Dartford,** taking competitive designs for municipal offices and assembly hall***Cargo Fleet Iron Co. Ltd., **Wellingborough,** 8 cu.yd. bucket excavator, to Ransomes & Rapier Ltd., Waterside Works, Ipswich***Liverpool Industrial Transportation Assn., **Liverpool,** plans by H. H. Nuttall for bridge across River Dee, $30,000,000. Government will be asked for substantial grant***Liverpool** Municipality plans housing development on 623 acres at Edward College, $1,500,000***Cumberland County Council, **Carlisle,** voted $600,000 for sanitorium*** **Gosport** Borough Council plans 22 houses, $520,000***J. B. Hyde & Co. Ltd., Wright St., Broadheath, plans factory, **Altrincham,** $600,000, site purchased***Birmingham** County Council voted $1,460,000 for civic office block, T. C. Howitt, Exchange Bldg., East Nottingham, archt.***Bengers Food Ltd., Otter Works, Strangeways, plans by J. and A. Andrews & Butterworth, 9 Saint James Square, Manchester, factory on 14 acre site, **Manchester,** $700,000***Melkridge Coal Co. Ltd., **Melkridge,** in market for boring plant to bore to depth of 300 ft. 20 coal tubs each 10 cwt. stone breakers, seven 30 in. grams, screens, elevators, hoppers and plant for output of 300 tons daily basalt***M. Murray, 174 Harrowgate Rd., **Leeds,** in market for 7 ton overhead electric traveling crane, 90 ft. span, 3 ton overhead electric traveling crane, 50 ft. span, ground operated 440 a/c voltage, 5 ton hand crab winch, and 50 ft. electric lattice steel derricking pole***H. A. Horrocks, c/o V. A. Sparrow Ltd., 14 Saint Mary Ave, E.C., **London,** in market for complete pulp and paper making plant, machinery and equipment***London, S. G. S. Young, secy, Bombay, Baroda and Central India R.R. 91, Petty France Westminster, interested in prices of chair and dog spikes*** British Ethyl Corp. Ltd., Thames House, Millbank S., **London,** plans works for manufacturing tetra ethyl lead and ethyl fluid. **Maturity in fall.**

Iran, Teheran—Dpt. Generale L'Industrial et des Mines in market for complete and considerable structural steel and other metal work for cotton mills construction at Achraf. Tenders can be obtained from Commercial Attache, Imperial Iranian Legation, Ling House, 13 South St. E., London, England, or any Consulate General.

Netherlands, Tilburg—Pessers & Zuylen, Tilburg, constructing worsted wool spinning mill, separate contracts awarded. To exceed $150,000.

New Zealand, Auckland—Johns Burns & Co., Ltd., Custom St., in market for generators for gasoline engines, 230 volts, 50 cycle, 500-2,500 watts capacity. Custom duty free. [illegible] address "Burnsco." An initial order of [illegible] 50 can be expected.

Northern Ireland, Belfast—Short Bros. [illegible], Rochester, England, making plans erecting [illegible] craft manufacturing plant. $600,000.

Scotland—Glasgow Transportation [illegible], **Glasgow,** to take bids in July for addi[illegible] turbo-alternator for Pickston Station $55[illegible] ***F. W. Moffat, Cumberland Terrace, A[illegible], in market for self contained air comp[illegible] drilling unit, 80/210 cu.ft. 100 lb. co[illegible] with drills up to 5 ft. suitable for lime[illegible] also 10 stone bogies 24 in. gage of ca[illegible] each 1 ton and 2nd hand warsop rock dr[illegible] Aberdeen Co. Council, **Inverurie,** purcha[illegible] acres and plans central infectious disease[illegible] pital $750,000***Governors and Senate Gla[illegible] University, **Glasgow,** plans new chemistry [illegible] ing $1,000,000. T. H. Hughes, archt.

Straits Settlements, Singapore—Federal [illegible] pensary, Ltd., Raffles Chambers, in marke[illegible] light chemicals. Custom duty free. Sa[illegible] and c.i.f. quotations should be sent.

PUBLIC BUILDINGS

PROPOSED WORK

★ **Ia., Iowa City**—Independent School Dist. defeated $600,000 bonds constructing [illegible] brick, stone high school. P.W.A. project. H. Fellows & Nedved, 814 North Tower Court, Chicago, Ill., archts.

Ia., Rockwell City—City Council election June 24, $175,000 revenue bonds, for light and power plant and equipment.

†Mass., Boston—Treas. Dpt. at office Supv. Archt., Wash., D. C., rejected bids Apr. 27 constructing cooling unit in parcel post building, Dorchester Ave. Noted Apr. 21, C. D.—Apr. 23, E. N.-R.

Mass., Newton—City, H. B. Hagman, supt. P. Buildings, City Hall, plans installing [illegible] alarm systems in various schools.

★ **Mass., Wellesley**—Town, R. T. Babson, chm. Building Comn., Wellesley, sketches by Perry, Shaw & Hepburn, 141 Milk St., Boston, and R. P. Bellows, assoc. archt., 8 Park St., Boston, new Senior High School, Seaver St., $500,000. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

★ **Mich., Lansing**—Bd. Water & Electric Light Comn., ordered preparations of detailed plans for a new $2,700,000 combined electric power and steam heating station, 6 stories high at least, Ottawa St. and Grand River. The new plant would make use of the new North Lansing Dam to provide condensing water.

Mo., Rolla — Missouri School of Mines & Metallurgy, Rolla, and Curators of University of Missouri, L. Cowan, secy., Jesse Hall, Columbia, rejected bids June 2, constructing 1 story 29x34 ft., brick, concrete hospital addition, P.W.A. project. Jamieson & Spearl, 1116 Arcade Bldg., St. Louis, archts. Noted May 25, C. D.—May 28, E. N.-R.

Neb., Omaha — Metropolitan Utilities Dist., 18th and Harney Sts., rejected bids Mar. 23 installing air conditioning in main downtown building. Est. about $25,000. Revising plans and takes new bids about Aug. 1. Noted Mar. 17, C. D.

N. Y., East Northport — Bd. Educ. Union School Dist. 4, election June 28, to vote on purchase and improvement of sites for 2 elementary schools. $420,000.

★ **N. Y., Elmira**—Bd. Educ. plans high school to relieve overcrowded condition in Dist. 6, Elmira, and Dists. 3 and 4, Southport. $750,000-$1,000,000. Architect and engineer not appointed. F. L. Christian, comr. Bd. Educ. Site not selected.

★ **N. Y., New York**—Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., plans by York & Sawyer, 100 East 42nd St., and by Kohn & Butler, 40 East 49th St., constructing group eight 2-8 story hospital buildings, at Welfare Island. $5,500,000. Noted May 18 and 22, C.D.—May 21 and 28, E.N.-R.

★ **N. Y., Plattsburg**—New York State Electric & Gas Corp., Ithaca, has obtained a restraining order preventing W.P.A. from proceeding with construction of municipal electric generating station and distribution system, for City, $520,000. Hearing to be held in near future. Noted May 27, C. D.—June 4, E. N.-R.

N. Y., Plattsburg — City, City Hall, plans constructing 3 story police and fire station. To exceed $140,000, incl. equipment. Architect and engineer not appointed. L. A. Bouyea, mayor.

★ **Ore., Salem**—State Commission for Capitol Building, plans by Whitehouse, Stanton & Church, Railway Exchange Bldg., Portland, and Trowbridge & Livingston & F. Keally, 101 Park Ave., New York, assoc. archts., new state house, $2,200,000. Noted Jan. 21, C. D.—Jan. 23, E. N.-R.

Pa., Johnstown — Bd. Educ., D. McMaster, supt., High School Bldg., Somerset St., sketches by H. M. Rogers, 1010 Johnstown Trust Bldg., Cochran Junior High School, 2 story, basement, brick, steel Valley Pike, $100,000; funds allotted by W.P.A. for flood repairs to various schools, start work soon, $147,000. Private architect.

R. I., Cranston—State, Emergency P. Wks. Comn., State House, Providence, soon takes bids process piping and machinery in laundry, at State Infirmary. C. R. Makepeace & Co., 10 Weybosset St., Providence, archt. P.W.A. project.

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†Federal Government

Public Buildings (Continued)

†S. D., **Mobridge**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids May 28, constructing U. S. Post Office. Will readvertise. Noted June 3, C. D.—May 7, E. N.-R.

Tex., Anahuac—Anahuac Ind. School Dist., plans by B. I. Irby, Kyle Bldg., Beaumont, 1 story, 90x180 ft., brick, rein.-con., semi-fireproof high school, incl. 14 classrooms, auditorium, gymnasium, etc. $200,000. P.W.A. allotment available. Noted Aug. 12, C. D.—Aug. 15, E. N.-R.

Tex., Perryton—City defeated bonds for new Diesel engine power plant. Est. $160,000. E. T. Archer & Co., 602 New England Bldg., Kansas City, Mo., engrs. Noted May 14, C. D.—May 21, E. N.-R.

Utah—State, c/o State Building Comn., Salt Lake City, has petitioned P.W.A. for amendment to its State building program for $335,000 to build $200,000 women's dormitory at University of Utah, $135,000 women's dormitory at State Agricultural College at Logan.

Utah, Price—City, c/o City Clerk, plans civic building to house city offices, gymnasium and auditorium, 1,200 seating capacity. $150,000. Architect not appointed.

†**Va., Dahlgren**—Yards & Docks, Navy Dpt., Wash., D. C., indefinitely postponed taking bids to have been opened June 10, constructing landing field, Spec. 7951. Noted May 27, C. D.—June 4, E. N.-R.

Va., Richmond—University of Richmond, Administration Bldg., plans by Carneal, Johnston & Wright, Electric Bldg., library, $300,000.

Que., St. John—Secretary Dpt. P. Wks., Ottawa, Ont., soon takes bids constructing new barracks for Dpt. Natl. Defence, Ottawa, Ont. $140,000. T. W. Fuller, Dpt. P. Wks., Ottawa, Ont., archt.

BIDS ASKED

†**Ala., Birmingham**—July 21, by P. Wks. Administration, Div. Housing, Wash., D. C., constructing superstructures of Smithfield Court Housing Project, Project H-2902. Noted Apr. 13, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

†**Ark., Magnolia**—July 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Calif., San Francisco**—June 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Federal Office Building, laboratory furniture and equipment.

†**D. C., Wash.**—June 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., miscellaneous changes in archives building.

†**D. C., Wash.**—June 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., ventilation in Dpt. Justice Building.

†**D. C., Wash.**—June 23, by Alley Dwelling Authority, 1300 E St., N.W., constructing and completing sixteen 1 story, brick, concrete or gypsum auto storage garages.

†**Ill., Lemont**—July 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000. Noted June 9, C. D.—June 11, E. N.-R.

†**Ind., Jeffersonville**—July 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator, etc. in U. S. Post Office.

†**Ia., Manchester**—July 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $62,000.

Kan., Kansas City—July 1, by D. T. McCombs, mayor, furnishing 1 new generating unit for power plant. $350,000. Burns & McDonnell, 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted May 14, C. D.—May 21, E. N.-R.

†**La., Abbeville**—July 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**La., Carville** — July 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing Psychiatric Ward National Home for Lepers.

†**La., New Orleans** — July 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing detention cell in U. S. Post Office.

★ †**Me., Togus**—July 14, by Vet. Administration Construction Service, constructing 3 and 4 story, 67x226 ft. barracks, 3 story, basement, 80x150 ft. recreational building, 10x200 ft., 10x175 ft. and 10x240 ft. corridors at Soldiers Home. $500,000. Noted May 12, C. D.—May 14, E. N.-R.

†**Md., Baltimore**—July 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairs and elevators in U. S. Custom House.

Mass., Lawrence—June 22, by City Clerk, City Hall, J. J. Daley, clk., City Hall, furnishing, installing conduits, cables and fire alarm apparatus in new fire alarm building. J. E. Allen, 351 Essex St., Lawrence, archt.

†**Mich., Chelsea**—July 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Mich., Zeeland**—July 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing mailing platform and enclosure, etc.

†**Minn., St. Cloud** — July 7, by Vet. Bu., Arlington Bldg., Wash., D. C., constructing Infirmary Building 49.

†**Minn., Waseca**—July 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post office. $66,000.

†**Miss., Lexington**—July 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Miss., New Albany**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $68,000.

†**Miss., Pontotoc**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Mo., St. Louis**—June 29, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing new metal and glass partition at U. S. Court House and Custom House.

Mo., St. Louis—Bd. Educ., 911 Locust St., bids about July 8, constructing Garfield School, 3 story, rein.-con., brick, 2612 Wyoming St. Est. about $242,000. G. W. Sanger, comr. School Buildings, archt. and engr. P.W.A. project. Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

N. M., Albuquerque—University of New Mexico, c/o W. R. Lovelande, pres. Bd. Regents, bids about Sept. 1, library, $370,000. P.W.A. project. H. H. Herman, 1228 California St., Denver, Colo., mechanical engr. J. G. Meem, Santa Fe, archt.

†**N. M., Portales**—July 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $85,000.

N. Y., Brooklyn—June 25, by Dpt. Hospitals, 125 Worth St., New York, altering and constructing boiler plant additions, Coney Island Hospital, Ocean Parkway and Avenue Z, East 6th St. and Guider Ave. $48,335. L. E. Jallade, 597 5th Ave., New York, archt.

†**N. Y., Brooklyn**—July 28, by P. Wks. Administration, Housing Div., Wash., D. C., constructing superstructures of Ten Eyck Housing Project, Project H-1301. Noted Dec. 23, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

N. Y., New York—June 25, by Dpt. Hospitals, 125 Worth St., plumbing, kitchen equipment, refrigeration and associated work, for superstructure Central Nurses residence, Welfare Island. $175,000. Morris & O'Connor, 101 Park Ave., archts. Noted June 15, C. D.—June 18, under "Contracts Awarded."

N. Y., St. Regis Falls—June 29, by Bd. Educ., electrical work in connection with superstructure of addition to school building. H. B. Nelson, clk.; adv. E. N.-R., June 18. Noted May 5, C. D.—May 7, E. N.-R., under "Contracts Awarded."

†**N. D., Sherwood**—July 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $17,000.

†**O., Dayton**—See "Contracts Awarded."

†**O., Maumee**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000; adv. E. N.-R., June 18.

†**Okla., Oklahoma City**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairs and alterations in lobby.

†**Pa., Phila.** — June 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., freight elevator entrance in U. S. Custom House and Appraisers Stores.

Pa., Wilkes-Barre — June 29, by Bd. City School Directors, F. Siegfried, secy., 81 North Washington St., brick, steel elementary school on Rolling Mill Hill, Airy and Jones St. T. A. Foster, Brooks Bldg., archt. Noted Feb. 10, C. D.—Feb. 13, E. N.-R.

†**S. C., Charleston**—July 8, by P. Wks. Administration, Div. Housing, Wash., D. C., constructing superstructures of Meeting Street Manor and Cooper River Court Housing Project, Project 8901. Noted June 1, C. D.—June 4, E. N.-R.

†**Tex., Kennedy**—July 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000. Noted June 2, C. D.—June 4, E. N.-R.

†**Tex., Port Arthur**—July 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office and Court House. $110,000. Noted Jan. 20, C. D.—June 23, E. N.-R.

†**Va., Norfolk**—June 24, by Yards & Docks, Navy Dpt., Wash., D. C., reroofing Building 107, at Naval Operating Base, Spec. 8217.

†**W. Va., Oak Hill**—July 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, $95,000.

Man., Winnipeg—June 22, by W. R. Clubb, minister P. Wks., constructing nurses home at Manitoba School for Mental Defectives, Portage la Prairie, for Province of Manitoba, $150,000.

†**C. Z., Summit**—July 8 (extended date), by Yards & Docks, Navy Dpt., Wash., D. C., constructing 4 quarters, etc., Spec. 7890. Noted May 14, C. D.

LOW BIDDERS

★ **N. Y., Brooklyn — Dpt. Hospitals, S. S. Goldwater, comr.**, 125 Worth St., New York, June 15, general contract nurses' home and training school, Kings County Hospital, from G. F. Driscoll Co., 580 Union St., $1,118,000 • • • heating, from D. J. Rice, Inc., 41-50 38th St., Long Island City, $159,700 • • • plumbing, from Lipsky & Rosenthal, 155 Utica Ave., $269,750. Noted June 1, C. D.—June 4, E. N.-R.

★ †**N. Y., Buffalo**—P. Wks. Administration, Div. Housing, Wash., D. C., June 12, constructing group 1 and 2 story houses and 2 and 3 story flats for Kenfield Housing Project, Project H-6703, from C. F. Haglin and Winston

†*Federal Government*

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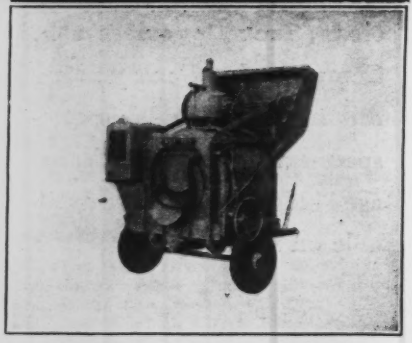

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Public Buildings (Continued)

Bros., 720 Natl. Bldg., Minneapolis, Minn., $4,076,900. Noted June 8, C. D.

★ **†Okla., Oklahoma City**—Treas. Dpt. at office Sup. Archt., Wash., D. C., June 10, constructing superstructures of Rotary Park Housing Project, Project H 8101, from L. Sanders, Trades Natl. Bldg., $1,500,000. Noted May 14, C. D.—May 21, E. N.-R.

★ **†Tenn., Memphis**—P. Wks., Administration, Div. Housing, Wash., D. C., June 12, constructing superstructures of Dixie Homes Project, Project H-3401, from S. and W. Constr. Co., Shrine Bldg., $2,329,619. Noted May 25, C. D.—May 26, E. N.-R.

CONTRACTS AWARDED

†Calif., Mare Island—P. Wks. Officer, Mare Island, Navy Yard, furnishing, installing equipment in Building 570 at Naval Prison, to Shirar Young Co., 1450 Van Ness Ave., San Francisco. $1,975. Bids May 27. Noted June 3, C.D.

†Calif., San Francisco — Con. Q.M., Fort Mason, replacing present wood flooring with terrazzo floors in Wards D-2, E-2, B-2 and L-2, at Letterman General Hospital, to P. Grassi & Co., 445 Bayshore Blvd., $11,906. Bids May 21.

Calif., Stockton—K. E. Parker Co., general contractors, 135 South Park St., San Francisco, reinforcing steel farm cottage building, State Hospital Grounds, to Concrete Eng. Co., 1280 Indiana St., San Francisco, for State***concrete, to Yolland Ice & Fuel Co., 248 East Miner Ave.***cast stone, to P. Grassi Co., 445 Bay St., San Francisco***steel windows, doors, to Soule Steel Co., 1750 Army St., San Francisco. Plumbing by day labor. Noted May 15, C. D.—May 21, E. N.-R., under "Contracts Awarded."

†Calif., Ukiah — Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to R. McCarthy, 1363 14th St., San Francisco, $62,688. Bids May 7. Noted May 11, C. D.—Apr. 9, E. N.-R.

†Conn., Clinton — J. W. Mylchreest, general contractor, 50 Bribard Ave., Middletown, steel erection and structural steel for U. S. Post Office, Commerce and Main Sts., for Treas. Dpt., Wash., D. C., to Berlin Constr. Co., Berlin*** finish, to Gustav Lowenthal Co., 82 Berlin St., Middletown***reinforcing steel, to Bethlehem Steel Co., 8th and Lehigh Sts., Bethlehem, Pa. Noted May 19, C. D.—May 21, E. N.-R., under "Contracts Awarded."

Conn., New London—A. F. Peaslee, Inc., 15 Lewis St., Hartford, general contractors, plumbing for 3 story, brick, steel, stone dormitory, to M. J. Daly & Sons, Inc., 555 Bank St., Waterbury, for Connecticut College for Women, K. Blunt, pres.***heating, to Hopson & Chapin Co., 231 State St., New London***iron, to Clinton Iron Wks., 13 Village St., East Hartford. Noted May 22, C. D.—May 28, E. N.-R.

†Conn., Thompsonville—T. F. Moran, general contractor, 41 Welton St., Waterbury, excavating for 1 story, 55x56 ft. post office, Gary, High and Bartlett Sts., for Treas. Dpt. at office Sup. Archt., Wash., D. C., to G. E. Duteru, Springfield, Mass. Noted Apr. 2, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

★ **†D. C., Wash.**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing additional buildings for U. S. Bureau Engraving and Printing and new building for Economics Bureau, Dpt. Agriculture, to John McShain, 1610 North St., Phila., Pa., $4,657,300. Bids Apr. 24. Noted Apr. 28, C. D.—Apr. 30, E. N.-R.

†Ga., Commerce—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to E. M. Williams, Monroe, $44,965. Bids May 26. Noted June 1, C. D.—May 7, E. N.-R.

†Ia., Jefferson—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Harlan Contg. Co., P. O. Box 107, Harlan, $46,377. Bids May 1. Noted May 14, C. D.—Apr. 9, E. N.-R.

†Ky., Lexington—Treas. Dpt. at office Sup. Archt., Wash., D. C., miscellaneous changes in Narcotic Farm, to Smyth & Co., 1416 F St. N.W., Wash., D. C., $8,884.

La., Baton Rouge—J. M. Smith, pres. Louisiana State University, constructing women's dormitory building, to Caldwell Bros. & Hart, 816 Howard Ave., New Orleans, $195,000.

La., New Orleans—City, reconstructing French Market buildings, alterations to meat and seafood market and alterations and additions to coffee shop, bazaar market and restaurant, to G. F. Favrot, Balter Bldg., $117,386***new masonry and frame vegetable and poultry market building, to O. M. Gwin, 3501 Fern St., $40,000***3 steel sheds, to J. Reiss, $44,500. Grand total $201,886.

†Md., Silver Springs—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Harwood Nebel Constr. Co., 2529 Pennsylvania Ave. N.W., Wash., D. C., $65,400. Bids Apr. 24. Noted Apr. 28, C. D.—Apr. 2, E. N.-R.

†Mass., North Truro—P. Wks. Officer, Navy Yard, Boston, repairing barracks at Naval Direction Finding Station, Spec. 8049, to Appleby & Olson, 6 South 2nd St., New Bedford, $13,932. Bids June 2. Noted June 9, C. D.—May 28, E. N.-R.

Mass., Plymouth—D'Amore Constr. Co., general contractors, 89 State St., Boston, painting, for brick, steel high school, to R. E. McCassey, 54 Playstead Rd., Newton, for Town, H. Donovan, chn. Building Comm. Noted [illegible] C. D.—Jan. 16, E. N.-R., under "Co[illegible]acts Awarded.

†Mich., Detroit—P. Wks. Administrati[illegible] Div. Housing, foundations for Parkside Housi[illegible] ect, Project H-1205, to Walbridge, Aldin[illegible] 409 Griswold St., $154,150. Bids M[illegible] Noted June 1, C. D.—Apr. 30, E. N.-R.

†Mich., Detroit — P. Wks. Administ[illegible] Div. Housing, Wash., D. C., constructi[illegible] section of foundations for Brewster H[illegible] Project, Project H-1201, to Martin & [illegible] mann Co., 955 East Jefferson Ave., $[illegible] Bids May 13. Noted May 20, C. D.—Ap[illegible] E. N.-R.

Minn., St. Peter—State, c/o Bd. Contro[illegible] St. Paul, general contract constructing 3 [illegible] basement, rein.-con., brick hospital super[illegible] ture, to Standard Constr. Co., 215 Sout[illegible] St., Minneapolis, $153,350***plumbing [illegible] heating, to P. J. Gallagher & Sons, Fari[illegible] $30,116***wiring, to Draper Electric Co[illegible] kato, $8,325***elevator, to L. Hoff Mfg [illegible] 82 South Robert St., St. Paul, $4,835. [illegible] total $196,626. Bids May 5. Noted Ma[illegible] C. D.—May 21, E. N.-R.

†Miss., Amory — Treas. Dpt. at office [illegible] Archt., Wash., D. C., constructing U. S. [illegible] Office, to Pittman Bros. Constr. Co., 2800 [illegible] Galvez St., New Orleans, La., $43,288. [illegible] May 8. Noted May 12, C. D.—Apr. 23, E. N.-R.

†Miss., Pascagoula—Treas. Dpt. at office [illegible] Archt., Wash., D. C., constructing U. S. [illegible] Office, to R. P. Farnsworth, 212 Nashville A[illegible] New Orleans, La., $46,199. Bids May [illegible] Noted May 21, C. D.—Apr. 30, E. N.-R.

†Mo., Fredricktown — Treas. Dpt. at [illegible] Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Hiram Lloyd Building & Constr. Co., 1608 Syndicate Trust Bldg., St. Louis, $45,787. Bids Apr. 10. Noted Apr. 14, C. D.—Mar. 19, E. N.-R.

Mo., Kansas City—City, plumbing for city hall, to G. R. Jorgenson, 3313 East 15th St., $115,375***heating and ventilating, to U. S. Engineering Co., 914 Campbell St., $191,000***electrical work, to Squire Electrical Co., 401 Wyandotte St., $126,740. Grand total $433,115. Bids June 4. Noted Feb. 10, C. D.—Feb. 13, E. N.-R., under "Contracts Awarded."

†N. H., Peterboro—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Loucke & Clarke Corp., Wallingford, Conn., $46,913. Noted May 8, C. D.—May 14, E. N.-R.

N. J., Harrison—Town, 518 Harrison Ave., general contract constructing town hall, to F. Briscoe Co., Inc., 287 South 19th St., $189,540***steel, to Oltmer Iron Wks., 326 Manhattan Ave., Jersey City, $26,497***heating, ventilating, to J. H. Cooney, 210 North 4th St., $22,666***plumbing, to Jaehnig & Peoples, 223 13th Ave., Newark, $10,278. Grand total $248,981. **P.W.A.** Noted June 4, C. D.—June 11, E. N.-R.

★ **N. J., Jersey City**—City, Assembly Chamber, City Hall, general contract, and A4, elevator and dumbwaiters new unit of medical center, to E. M. Johnson, 706 Bergen Ave., Jersey City, $1,256,300***steel, to Lehigh Structural Steel Co., 17 Battery Pl., New York, $271,267*** plumbing, to W. W. Farrier, 44 Montgomery St., $229,648***heating, to J. P. Farrell, 269 Camden St., Newark, $110,188***electrical work, to J. Newmann, 26 Journal Square, $169,750. Grand total, $2,037,153. General contractor sublet contract for elevators, New York, $139,300 and dumbwaiters, to Otis Elevator Co., 11th Ave. and 26th St. **P.W.A.** Noted May 22, C. D.—May 28, E. N.-R.

N. J., Woodbine—Dpt. Institutions & Agencies, State House, Trenton, general contract constructing hospital building for State Colony for Feeble Minded Males, to Linden Supply Co., 305 West Elizabeth St., Linden, $57,800***steel, to American Iron Wks., 1455 Bway., Camden, $7,777***plumbing, to W. H. Kentner, 128 East Wildwood Ave., Wildwood, $7,525***electrical work, to Brown Electric Co., 10 New Jersey Ave., Trenton, $3,350. Grand total $76,452. **P.W.A.** Noted May 18, C. D.—May 21, E. N.-R.

N. Y., Altona — Bd. Educ. Central School Dist. 1, general contract school, to H. J. Blessing, 1439 Western Ave., Albany, $142,524*** heating, to J. Hunter Heating & Contg. Co., 68 Liberty St., Albany, $22,794***plumbing, to Carson Bros., Woodruff Ave., Saranac Lake, $10,551***electrical work, to Acme Electric Co., 11 Exchange St., Glens Falls, $9,939. Grand total $185,808. **P.W.A.** Bids May 18. Noted May 21 and June 3, C. D.—May 7, E. N.-R.

N. Y., Binghamton—W. Berbussee, Jr., general contractor, 101 Park Ave., New York, 1,000 tons structural steel for school, for Bd. Educ., to Leach Steel Co., Steel St., Rochester. **P.W.A.** Bids May 5. Noted May 26, C. D.—June 4, E. N.-R., under "Contracts Awarded."

N. Y., Brooklyn—H-R-H Constr. Co., general contractors, 9 East 40th St., New York, 1,800 tons structural steel and steel erecting for P. S. 239, Neptune Ave. and West 24th St., for Bd. Educ., 500 Park Ave., New York, to Lehigh Structural Steel Co., 17 Battery Pl., New York, and Allentown, Pa. Noted Apr. 30, C. D.—May 7, E. N.-R., under "Contracts Awarded."

★ **N. Y., Brooklyn**—Bd. Educ., 500 Park Ave., New York, plumbing for P.S. 113 and 239, to J. E. Kahn, 224 West 20th St., New York, $75,990 and $80,890 respectively***heating, to

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†Federal Government

Public Buildings (Continued)

D... Rice, Inc., 41-50 38th St., Long Island City, $172,370 and $170,770 respectively*** electrical work P.S. 113, to T. F. Jackson, 25 W... 43rd St., New York, $71,300***fixtures, to Weiss & DeVeau, 1333 Fulton St., $15,100 ***electrical work for P.S. 239, to J. G. Hellman, Grand Central Terminal, New York, $72,500***fixtures, to Shapiro & Aronson, 20 Warren St., New York, $15,275. Grand total $674,195. Bids May 18. Noted May 19, C.D. —May 14, E.N.-R.

N. Y., Brooklyn—Dpt. Hospitals, 125 Worth St., New York, plumbing for boiler plant at Coney Island Hospital, to Fox Plumbing Co., 101 Park Ave., New York, $1,882***boiler plant, to Dierks Heating Co., 210 East 31st St., New York, $57,600***electrical work, to J. D. Tallock, 1776 Bway., New York, $14,445. Grand total $73,927. **P.W.A.** Bids Mar. 26. Noted Mar. 27, C. D.—Mar. 12, E. N.-R.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, electrical work for P. S. 234, to Berkshire Electric Co., 50 Court St., $44,980. Bids May 8. Noted May 11, C.D.—Apr. 30, E.N.-R.

†**N. Y., Buffalo**—Huber & Fix, general contractors, 860 Hertel Ave., Buffalo, structural steel for garage, boathouse, etc., for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Buffalo Structural Steel Corp., 166 Dart St., Buffalo; painting, to C. M. Selby Sons, 1563 Jefferson Ave. Noted May 29, C. D.—June 4, E. N.-R.

N. Y., Candor—F. W. O'Connell, general contractor, 329 Water St., Binghamton, stone for school, for Union Free School Dist. 1, to Wyoming Cut Stone Co., Scranton, Pa.***roofing, to Sullivan Bros. & Lent, 8 Riley Pl., Binghamton***tile and marble, to United Marble & Tile Co., Pillston, Pa. **P.W.A.** Noted Mar. 30, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

N. Y., Dansville—A. Friederich & Sons Co., general contractors, 710 Lake Ave., Rochester, carpentry work for school, School St., for Bd. Educ., Dansville, to Anthony Links Sons, 616 North Goodman St., Rochester; structural steel, to F. L. Heughes & Co., 1029 Lyell Ave., Rochester. **P.W.A.** Noted Apr. 24, C. D.— Apr. 30, E. N.-R., under "Contracts Awarded."

★**N. Y., Dongan Hills**—Dpt. Hospitals, 125 Worth St., New York, general contract erecting and completing Children's Hospital at Sea View Hospital, to Federal Constr. Co., 101 Park Ave., New York, $528,600***plumbing, to Harcho Bros., Inc., 215 East 37th St., New York, $103,997***heating, to H. Starkman & Bros., 132 Brook Ave., New York, $67,660*** electrical work, to C. F. Sweigel & Co., 114 East 32nd St., New York, $49,000. Grand total $749,257. **P.W.A.** Bids Apr. 28. Noted Apr. 29, C.D.

N. Y., Gouverneur—Union Free School Dist. 1, plumbing for school, to Ryan Plumbing Co., 160 Court St., Watertown***heating, to Farden, Gamache & Murphy, 422 Ford St., Ogdensburg ***electrical work, to Hillebrand & Owen, Everson Bldg., Syracuse. Bids Apr. 9. Noted Mar. 27, C. D.—Apr. 2, E. N.-R.

N. Y., Hinsdale—Liechti & Mallory, general contractors, 426 York St., Olean, electrical work for school, Olean Rd., for Bd. Educ., to Robertson Electric Constr. Co., 126 South Elmwood Ave., Buffalo***structural steel, to R. S. McMannus Steel Constr. Co., 1254 East Ferry St., Buffalo***stone, to Jamestown Stone & Marble Co., 150 River St., Jamestown***plumbing and heating, to Shortell Bros., 614 West State St., Olean. Noted May 4, C. D.—May 7, E. N.-R., under "Contracts Awarded."

N. Y., Jamestown—Haas Constr. Co., general contractors, 1001 Monroe Ave., Jamestown, roofing for school, Cole Ave., for Bd. Educ., to Laco Roofing & Asbestos Co., Inc., 421 West Main St., Falconer***metal lathing and plastering, to G. E. Hudson Corp., Crosby Bldg., Buffalo***millwork, to Chall Lumber Co., Fluvanna Ave. **P.W.A.** Noted Apr. 30, C. D.—May 7, E. N.-R., under "Contracts Awarded."

N. Y., Johnson City—F. W. O'Connell, general contractor, 329 Water St., Binghamton, structural steel for school for Bd. Educ., Johnson City, to Bethlehem Steel Co., Bethlehem, Pa.***roofing, to Binghamton Slag Roofing Co., 209 Water St., Binghamton***metal lathing and plastering, to James Swain, 36 Margaret St., Binghamton. Noted May 4, C. D.—May 7, E. N.-R., under "Contracts Awarded."

N. Y., Keesville—West Bros., general contractors, Rouses Point, structural steel for school, for Central School Dist. 1, Keesville, to Vermont Structural Co., Burlington Vt.***marble and tile, to F. Solari, Burlington, Vt.***millwork, to A. Mason & Sons, Peru. **P.W.A.** Noted May 12, C. D.—May 14, E. N.-R., under "Contracts Awarded."

N. Y., New Brighton—Bd. Educ., 500 Park Ave., New York, plumbing for Curtis High School addition, to R. W. Baylor, Inc., 1606 Victory Blvd., Port Richmond, $53,877***heating, to Almirall & Co., Inc., 53 Park Row, New York, $97,888***electrical work, to Rao Electrical Equipment Co., 739 Lexington Ave., New York, $45,950. Grand total $197,714. Bids Apr. 24. Noted Apr. 14, C.D.—Apr. 16, E.N.-R.

N. Y., New York—Bd. Educ., 500 Park Ave., New York, plumbing for Bronx Industrial High School for Girls, to J. F. Egan Co., 3013 Grand Concourse, $62,000***heating, to Almirall & Co., Inc., 53 Park Pl., $166,300***electrical work, to Arc Electric Constr. Co., 739 2nd Ave., $113,300***fixtures, to Simes Co., Inc., 22 West 15th St., $27,897. Grand total $369,509. Bids May 22. Noted May 25, C. D.

N. Y., New York—Dpt. Hospitals, 125 Worth St., New York, general contract hospital, at Welfare Island, to W. W. Constr. Co., 15 East 40th St., $189,290***power plant, to T. G. Eagan Refractory, 3013 Grand Concourse, New York, $287,597***plumbing for power plant, to Harcho Bros., 21 East 37th St., $7,477. Grand total $484,364. **P.W.A.** Bids Mar. 25. Noted Mar. 26, C.D.—Mar. 12, E.N.-R.

★**N. Y., New York**—Dpt. Hospitals, 125 Worth St., general contract superstructure Central Nurses residence, Welfare Island, to J. Weinstein & Rubin, 66 Court St., Brooklyn, $1,163,709 ***electrical work, to J. and M. Hoffman, Inc., 3318 Avenue M, Brooklyn, $107,400***heating, to Baker Smith & Co., 576 Greenwich Ave., $115,789. Grand total $1,386,889. **P.W.A.** Bids Apr. 14. Noted Apr. 15, C.D.—Apr. 9, E.N.-R.

N. Y., New York—Dpt. Hospitals, 125 Worth St., plumbing for structure adjoining machine shop at City Home District, Welfare Island, to Ostroe Plumbing & Heating Co., 357 West 25th St., New York, $1,295***refrigerating, to Arctic Eng. Co., 123 White St., $18,163***brine, to H. Sand & Co., Inc., 518 Greene St., $13,747. Grand total $33,205. Bids Apr. 22. Noted Apr. 23, C.D.—Apr. 16, E.N.-R.

†**N. Y., New York**—Yards & Docks, Navy Dpt., Wash., D. C., air conditioning Naval Medical Supply Depot, Spec. 8106, to Adams Eng. Co., 55 West 42nd St., $7,150.

N. Y., St. Regis Falls—J. Duffin, general contractor, Malone, structural steel for school for Central School Dist. 1, to Vermont Structural Co., Burlington, Vt.; roofing, to Hanna & Porter, Inc., 15 West Main St., Malone. **P.W.A.** Noted May 5, C. D.—May 7, E. N.-R., under "Contracts Awarded."

N. Y., Spencer—J. M. Knowlton Co., Inc., general contractors, 201 Robinson St., Binghamton, structural steel for school, for Central School Dist. 1, to Anthracite Bridge Co., Scranton, Pa.; ornamental iron, to Titchener Iron Wks., 23 Griswold St., Binghamton. **P.W.A.** Noted May 5, C. D.—May 7, E. N.-R., under "Contracts Awarded."

N. Y., Syracuse—Bd. Educ., R. D. Marvin, mayor, painting 32 schools and constructing brick walls and parapets at certain schools, relief labor $50,000. **W.P.A.** G. L. Noble, Old Post Office Bldg., Syracuse, procurement officer W.P.A., will purchase materials.

N. Y., Union Springs—E. L. Van Sickle & Co., general contractors, Hooker-Fulton Bldg., Bradford, Pa., structural steel for school, for Bd. Educ. Dist. 1, to F. L. Heughes Co., 1029 Lyell Ave., Rochester***marble and tile, to Italian Mosaic & Marble Co., 120 Walton St., Syracuse***steel sash, to Truscon Steel Co., Youngstown, O. **P.W.A.** Noted May 18, C. D. —May 21, E. N.-R., under "Contracts Awarded."

†**N. C., Burlington**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. A. Jones Co., 613 Commercial Bank Bldg., Charlotte, $114,300. Bids May 28. Noted June 3, C. D.—May 7, E. N.-R.

N. D., Devils Lake—Bd. Educ., general contract constructing superstructure for 2 story, basement, 262x295 ft., rein.-con., tile, steel school, to H. L. Stavn, Hibbing, Minn., $255,000***plumbing, heating, ventilating, to Healy Plumbing & Heating Co., 278 West Kellogg Blvd., St. Paul, Minn., $41,800***wiring, to Lake Electric Co., Devils Lake, $16,590***temperature control, to Johnson Service Co., 922 2nd Ave. S., Minneapolis, Minn., $4,930. Grand total $318,320. **P.W.A.** Noted May 18, C. D. —May 21, E. N.-R.

†**O., Dayton**—Vet. Bu., Arlington Bldg., Wash., D. C., remodeling present building for 3 story building and constructing 3 story, basement, brick, concrete administration building addition, plain found., day labor. $75,000. Bids May 26 rejected. Noted June 1, C. D.— Apr. 30, E. N.-R.

†**Okla., Watonga**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to McMiller Constr. Co., 301 Bway. Tower, Enid, $45,523. Bids May 8. Noted May 14, C. D.—Apr. 23, E. N.-R.

R. I., Burrillville—A. F. Smiley Constr. Co., general contractors, 202 Oak Hall Bldg., Pawtucket, electrical work for school, for Town, Supt. Schools, to Brady Electric Co., Inc., 236 Bedford St., Fall River, Mass.; plumbing, to Frank Dupuis Co., 599 Main St., Pawtucket. Noted Apr. 27, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

†**R. I., East Providence**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to DiSandro Bros., 106 Langdon St., Providence, $51,195. Bids Apr. 17. Noted Apr. 21, C. D.—Mar. 26, E. N.-R.

R. I., Howard (Cranston)—Matthew Cummings Co., general contractors, 43 Tremont St., Boston, Mass., structural steel for hospital at State Infirmary, to Jas. H. Tower Iron Wks., 50 Borden St., Providence, for State, Emergency P. Wks. Comn., State House, Providence. **P.W.A.** Noted May 19, C. D.—May 21, E. N.-R., under "Contracts Awarded."

★**R. I., Providence**—Bd. Contr. & Supply, at office of City Clerk, general contract Senior High School, 3 story, basement, 245x290 ft., brick, steel, limestone, to John Bowen Co., Inc., 129 Newburg St., Boston, Mass., $1,288,000*** electrical work, to Fischbach & Moore, Inc.,

†*Federal Government*

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Public Buildings (Continued)

444 Bway., New York, $57,750***plumbing, to T. J. Conway Co., 77 Winter St., Springfield, Mass., $78,649***heating, to James S. Cassedy, Inc., 133 Austin St., Cambridge, Mass., $217,390. Grand total $1,641,789. Est. $1,000,000. **P.W.A.** Bids May 25. Noted May 28, C. D.—June 4, E. N.-R.

R. I., Warwick—Hanson & Erickson, Inc., general contractors, Greenwood Ave., Greenwood, cast stone for brick, steel municipal garage, to New England Cast Stone Co., 4 Edwards St., Providence, for City, J. A. O'Brien, mayor, City Hall***electrical work, to Stanford Electric Constr. Co., 4 Westminster St., Providence ***iron, to J. H. Tower Iron Wks., 50 Borden St., Providence. Noted Jan. 17, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

★ **Utah, Ogden**—City, Bd. Educ., general contract constructing superstructure for new high school, to G. A. Whitmeyer & Sons Co., 2759 Grant Ave., $724,947. **P.W.A.** Noted June 9, C. D.—June 11, E. N.-R.

†**Wash., Centralia**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to H. Boyer Son & Co., Olympia, $62,000. Bids Apr. 22. Noted Apr. 28, C. D.—Mar. 26, E. N.-R.

†**Wis., Berlin** — Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Bracker Constr. Co., 710 Natl. Bldg., Minneapolis, Minn., $50,085. Bids Apr. 17. Noted Apr. 21, C. D.—Mar. 26, E. N.-R.

Wis., Pewaukee—Joint School Dist. 1, general contract grade school addition, to Foster Morris Co., 2140 North Oakland Ave., Milwaukee, $87,567***heating and ventilating, to Sohns Mfg. Co., Grafton, $21,473***plumbing, to O. A. Waskow, 2222 West State St., Milwaukee, $10,876***electrical work, to Central States Equipment Co., 2538 North 30th St., Milwaukee, $7,295. Grand total $127,211. General contractor sublets contract for marble, to Walter Salmon Marble Co., 1536 West Pierce St., Milwaukee***tile, to W. F. Durner Co., Inc., 815 West St. Paul Ave., Milwaukee***terra cotta, to Wisconsin Mosaic & Tile Co., 2233 North 4th St., Milwaukee***glazing, to W. F. Zummach, 1652 North 2nd St., Milwaukee ***sheet metal, to Badger Sheet Metal & Furnishing Co., Inc., 1529 North 16th St., Milwaukee***floor surfacing, to Shannon Floor Surfacing Co., Inc., 1510 North 50th Pl., Milwaukee***lath and plastering, to Standard Plastering Co., Inc., 4712 North 29th St., Milwaukee ***roofing, to F. J. A. Christiansen Roofing Co., Inc., 2139 West Purdue St., Milwaukee***steel and iron, to C. Hennecke Co., 3225 North Pierce St., Milwaukee***insulation, to Insulation Service, Inc., 423 North 27th St., Milwaukee*** excavation, to Thiele Edwards Trucking Co., Pewaukee.

†**Wis., Rice Lake**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. Kratochvil, New Prague, Minn., $54,711. Bids June 2. Noted June 8, C. D.—May 14, E. N.-R.

Ont., Toronto—Carter-Hall-Aldinger Ltd., general contractors, Mills and Cherry Sts., cut stone for 2 story, 100x112 ft., brick, steel Postal Station, Younge St., for Dpt. P. Wks., Ottawa, to Ritchie Cut Stone Co. Ltd., 1221 Bay St. ***steel sash, to Architectural Bronze & Iron Wks., Lansdowne Ave.***granite, to Thomson Monument Co. Ltd., 862 Dupont St. Noted Oct. 28, C. D.—Oct. 31, E. N.-R.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ga., Gainesville—Brenan College, c/o S. L. Smith, pres., Gainesville, sketches by W. J. J. Chase, 143 Peachtree St., Atlanta, rebuilding Dixie Hunt Hotel, 4 and 5 story, basement, brick walls, cast stone trim, rein.-con., structural steel frame construction, etc.

Ill., Newton—O. Yelvington plans by O. W. Stiegemeyer, 4817 Oleatha Ave., St. Louis, Mo., and soon takes bids 1 story, 38x115 ft., brick, steel theatre, 400 seating capacity.

Ill., Ottawa—Gregory Circuit, c/o Roxy Theatre, plans 2 story, basement, rein.-con., brick, steel, stone theatre, 1,165 seating capacity. Site purchased. **Maturity in fall.**

Ind., Anderson—St. Johns Hospital, c/o Sisters of Holy Cross, 20th at Jackson Sts., plans 3 story, basement, 50x150 ft., brick, steel hospital addition, $175,000.

Mass., Cambridge—Radcliffe College, 10 Garden Sts., plans by Ames & Dodge, 148 State St., Boston, 3 story, basement, brick, steel, stone dormitory, concrete found., Garden St. To exceed $150,000.

Mass., Springfield—Holy Name Roman Catholic Church, T. A. McGovern, pastor, 323 Dickinson St., plans church, Alderman St. $150,000. **Maturity indefinite.** Architect not appointed.

Mich., Ann Arbor—First Presbyterian Church, 1432 Washtenaw Ave., plans by Moyers, Murray & Phillip, 2 West 47th St., New York, 2 story, basement, 288x348 ft., brick, rein.-con., steel, stone church, plain found., Washtenaw Ave. $200,000.

Mo., St. Louis—Park Amusement Co., c/o Park Airdome, Morganford Rd. near Connecticut St., plans rein.-con., brick, stone theatre, 700 seating capacity, Morganford Rd. near Hartford St. Site obtained. **Maturity soon.**

Neb., Omaha — Augustana Lutheran Church plans new church, 38th and Lafayette Sts. $150,000. Architect not appointed.

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★ **N. J., Lawrenceville**—Lawrenceville School (gift of E. S. Harkness, 654 Madison Ave., New York) plans altering and constructing additions to group school buildings, incl. altering Memorial Hall and Fathers Building, also new administration building. To exceed $1,000,000.

★ **N. Y., Albany**—S. S. Kresge Co., H. H. Servis, vice-pres., in charge of Real Estate, 2727 2nd St., Detroit, Mich., plans constructing 1 or 2 new buildings at 15-21 Pearl St. Unofficial est. $3,000,000. **Maturity in 1937.** R. H. Whitlach, 2727 2nd St., Detroit, Mich., engr. and archt.

N. Y., Bayside—Bayside Clearview, Inc., W. F. Ring, in charge, plans group brick, frame dwellings, Bodlaw-at-Bayside. $140,000. Private plans.

N. Y., Brooklyn—Apartment Operating Corp., 111 East 40th St., New York, plans by E. Flagg, 111 East 40th St., New York, constructing group 3 story, brick tenements, 72nd St. near Colonial Rd. Est. about $140,000.

N. Y., Brooklyn—Casa Realty Corp., 26 Court St., plans by J. Lubroth, 26 Court St., group 2 story, brick dwellings, 55th St. near New Utrecht Ave. $140,000.

N. Y., Brooklyn — Fifth Impvt. Corp., 215 Montague St., plans by T. Goldstone, 191 Joralemon St., group 1 story, brick dwellings, Hubbard Pl. and Kings Highway. $140,000.

N. Y., Brooklyn—Linden Gardens, Inc., 719 Linden Blvd., plans by I. Kirshenbilt, 928 New Lots Ave., constructing group 1 story, brick dwellings, 617 Lenox Rd. and vicinity. $140,000.

N. Y., Buffalo — John Feist Constr. Corp., Jackson Bldg., plans by H. C. Swain, 227 Oxford Ave., Buffalo, constructing residences, Groveland Ave., with air conditioning. To exceed $140,000. Owner will purchase material.

N. Y., Elmhurst—Carol Management Corp., c/o King & King, 40-09 82nd St., Jackson Heights, plans 6 story apartment, Whitney Ave. near Case St. To exceed $300,000. Site acquired.

N. Y., Flushing—S. Cohen, c/o Katherine Willes, Northern Blvd. near Parsons Blvd., plans constructing apartment, Northern Blvd. near Parsons Blvd. To exceed $150,000. Site acquired. Architect not appointed.

N. Y., Flushing—Orips Realty Corp., 192nd St. and Hollis Court, Hollis, plans by A. E. Allen, Garden City, group frame dwellings, 48th Ave. and 192nd St. $140,000.

N. Y., Jackson Heights—Loomis J. Grossman, 535 5th Ave., New York, plans 6 story apartment, Hayes Ave. and 73rd St. $150,000. Site purchased. Architect not appointed.

N. Y., New York—College of Sacred Heart, 133rd St. and Convent Ave., plans by F. W. Rinn, c/o owner, 3 story dormitory, 130th St. and Convent Ave. $250,000.

N. Y., New York—Forty-Nine Realty Corp., L. Lipman, pres., plans altering heating, plumbing in two 5 story apartments, 143 West 113th St. $40,000 with fixtures. Architect not appointed.

N. Y., New York—Gustave Maier, 230 Bradley Ave., Mount Vernon, plans by L. and L. Levy, 527 5th Ave., altering heating, plumbing in 5 story apartment, 266 West 11th St. $37,000 with fixtures.

N. Y., New York—Morris Marcus & W. Barkin, 35 Van Cortland Ave. E., plans 6 story apartment, Valentine Ave. and 183rd St. $140,000 or more. Site acquired.

N. Y., New York—Nelwin Realty Corp., H. I. Litwin, pres., 436 Bway., plans 6 story apartment, 70 Seaman Ave. $140,000 or more. Site acquired. Architect not appointed.

N. Y., New York—One Hundred Fifty-Three East 96th Street Corp., 22 Williams St., plans by C. H. Lench, 512 5th Ave., New York, altering heating, plumbing in 5 story apartment, 159 East 96th St. Est. about $100,000.

N. Y., Valley Stream—H. L. Scholer, 160-16 Jamaica Ave., Jamaica, plans group dwellings and subdivision Ocean Ave. $140,000 or more. Site acquired. Architect not appointed.

N. Y., South Ozone Park—S. A. Gogel, 8535 Parsons Blvd., Jamaica, plans by W. P. LaValle, c/o owner, group 2 story, brick dwellings, 130th Ave. and Van Wyck Blvd. $140,000.

N. Y., Westbury—LeRoy Newell & Porter Daniel, Hillside Ave., plans group brick dwellings and 23 acre tract development, Hillside Ave., Wheatley Ridge. $140,000. Architect not appointed. Site acquired.

N. Y., Woodside—Jess Homes Builders, Inc., 37-31 76th St., Elmhurst, plans by A. H. Eccles, 1 Bridge Plaza, Long Island City, group 2 story, brick dwellings, 48th Ave. and 43rd St. $140,000.

Pa., Bethlehem — Lehigh University plans laboratory addition. To exceed $140,000.

S. C., Rock Hill—St. Phillip's Mercy Hospital, plans by A. D. Gilchrist, Rock Hill, 4 story, fireproof wing for hospital. To exceed $140,000. Owners and operators of hospital are Sisters of St. Francis.

Tex., Houston—J. H. Edmonds, 90 Barkdull St., plans group of 75 dwellings. $350,000. Private plans.

BIDS ASKED

Calif., San Francisco — See "Contracts Awarded."

Mo., St. Charles—June 25, by Wabash R.R. Co., E. L. Crugar, ch. engr., Ry. Exch. Bldg., St. Louis, and St. Charles Bridge Co., Railway Exch. Bldg., St. Louis, 1 story, 64x23 ft. brick, water and passenger station addition, water tank, water columns, water supply line, gravel surfacing driveway, etc. P.W.A. Project.

N. J., Millington—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Hollis—See "Contracts Awarded."

N. Y., St. Albans—See "Contracts Awarded."

CONTRACTS AWARDED

Ariz., Grand Canyon—Union Pacific R.R. Co., c/o Union Pacific R.R. Co., constructing new lodge building to replace one destroyed by fire, to Ryberg Bros., Interurban Bldg., Salt Lake City, Utah, $250,000 cost plus basis. Bids Apr. 8. H. C. Mann, ch. engr. Noted Feb. 1, C. D.—Feb. 20, E. N.-R.

Calif., Burlingame—W. P. Peugh, archt., 333 Montgomery St., San Francisco, rein.-con. bank and office, to Cahill Bros., 206 Sansome St., San Francisco, for San Francisco Bank, 520 California St., San Francisco. Est. $150,000. Noted June 4, C. D.—June 11, E. N.-R.

Calif., San Francisco — A. J. Herzig, 3300 Ocean Ave., fifty to seventy-five 1 story, frame, stucco residences, Pinelake Park, day labor and sub-contracts***electrical work, to Richmond Electric Co., 1370 40th Ave.***plumbing, to G. Rehn, 1919 Mission St.***heating, to Atlas Heating & Ventilating Co., 557 4th St.***iron grillwork, to Ace Iron Wks., 159 South Park St.***brick work, to A. J. Tole, 1112 Fitzgerald Ave.***millwork, to A. Schafer & Co., 732 Bryant St.***hardware, to Palace Hardware Co., 581 Market St.***structural steel, to Bethlehem Steel Co., 20th and Illinois Sts.***lumber, to Loop Lumber Co., Central Basin, San Francisco, and Colma Mill & Lumber Co., Colma. Est. $5,000 and $6,000 each. D. E. Jackle, 126 Post St., archt.

Conn., Meriden—St. Mary's Roman Catholic Parish, A. Kaicher, pastor, general contract 2 story, basement, brick, stone parochial school, convent and parish house, Grove St., to H. Wales Lines Co., 134 State St. Est. $140,000. Bids May 28. Noted May 19, C. D.—May 21, E. N.-R.

Fla., Miami—Corporation, 8 story hotel, Ocean Dr. and 6th St., to Prufect Wein Constr. Co., 2655 Collins Ave., Miami Beach. Est. $250,000.

Fla., Miami Beach—P. W. Miller, 1580 Collins Ave., hotel, to O'Neill-Orr Building Corp., 835 Collins Ave. Est. $140,000.

Fla., Miami Beach — Braznell Estate, 4310 Collins Ave., or c/o contractor, hotel, to C. Green, 1409 Alhambra Circle, Coral Gables. Est. $200,000.

Md., Baltimore—Federal Land Bank, Baltimore Trust Bldg., remodeling 6 story, basement and constructing 4 story addition to office building, St. Paul and 24th Sts., to N. E. Constr. Co., 6 West Madison St., $400,000 plus. Noted May 27, C. D.—June 4, E. N.-R.

N. J., Millington—I. & D. S. Meister, Inc., 292 Madison Ave., New York, constructing tract development and dwellings on 194 acre site, Springfield Ave., labor and separate contracts. $140,000 or more. Noted May 18, C. D.—May 21, E. N.-R.

N. M., Albuquerque — Mrs. A. G. Simms, constructing Sandia Girls School, to P. Rogers, Inc., P. O. Box 1006, Pueblo, Colo. Est. $150,000. J. G. Meem, Santa Fe, archt.

N. Y., Albany—Academy of Holy Name, general contract 3 story, basement, 60x90 ft. school addition, Madison Ave. and Robin St., to J. B. Waldbillig, Inc., Albany. Est. about $140,000. J. H. Moloney & J. C. Gault, Albany, archts.

N. Y., Albany—W. J. Murray Constr. Co., general contractors, 415 South Pearl St., Albany, structural steel for convent, Second Ave., for Our Lady Help of Christians, 2nd Ave., to Clausen Iron Wks., Tivoli St.***reinforcing steel and steel joists, to Truscon Steel Co., Youngstown, O.***painting, to C. F. Eckert Co., 103 North Lake Ave.***stone, to Adams Ross Cut Stone Co., 1003 Bway. Noted June 1, C. D.—June 4, E. N.-R., under "Contracts Awarded."

N. Y., Brooklyn—A. I. Namm & Sons, Fulton and Hoyt Sts., air conditioning department store, 203 Livingston St., to Carbondale New York Co., 173 Christopher St., New York. Est. about $90,000. Noted May 13, C. D.—May 21, E. N.-R.

N. Y., Brooklyn—Corporation, c/o J. Dorment, 66 Court St., constructing group 2 story, brick dwellings at Marine Parkway and Fillmore Ave., separate contracts. $140,000. Owner purchasing materials. B. Doriesler, c/o owner, archt.

N. Y., Brooklyn—Cameo Impvt. Corp., 1489 East 46th St., group 1 story, brick dwellings, 1706 Avenue W, separate contracts and day labor. $140,000. I. Kallich, 375 Fulton St., archt. Owner is purchasing materials. Noted May 11, C. D.—May 14, E. N.-R.

N. Y., Brooklyn—Edrom Realty Corp., 58 Gelson Ave., 6 story apartment, 50 Gelson Ave., separate contracts now being awarded. $165,000. I. Seelig, 153 Pierrepont St., archt. Noted May 7, C. D.—May 14, E. N.-R.

N. Y., Brooklyn—Gondolier Realty Corp., 240 Crown St., 6 story apartment, Montgomery St. and Stoddard Pl., separate contracts now being awarded. $175,000. Cohn Bros., 191 Joralemon St., archts. Noted May 11, C. D.—May 14, E. N.-R.

N. Y., Brooklyn—Lemarl Realty Corp., 3117 Park Pl., c/o J. Marcowitz, constructing 6 story apartment, 1420 Ocean Ave., separate con-

†*Federal Government*

Commercial Buildings (Continued)

tracts now being awarded. $170,000. Kavy & Kavovitt, 16 Court St., archts. Noted May 11. C. D.—May 14. E. N.-R.

N. Y., Brooklyn—Sabilla Homes, 1612 West 5th St., constructing 2 story, brick dwellings, 1239 85th St., separate contracts now being awarded. $140,000. G. Lamarca, 364 Fulton St., archt. Noted Apr. 10. C. D.—Apr. 16, E. N.-R.

N. Y., Brooklyn—Seventy-One Ocean Parkway Corp., 711 Ocean Parkway, 6 story apartment, Ocean Parkway and East 7th St., separate contracts now being awarded. $270,000. Cohn Bros., 191 Joralemon St., archts. Noted May 11. C. D.—May 14, E. N.-R.

N. Y., Brooklyn—Waylin Holding Corp., 899 Nostrand Ave., constructing 6 story apartment, Linden Blvd. and Caton Ave., separate contracts now being awarded. $400,000. W. Dorfman, c/o owner, archt. Noted May 11, C. D.—May 14, E. N.-R.

N. Y., Brooklyn—English Evangelist Church of Good Sheperd, 4th Ave. and 74th St., Sunday School, 4th Ave. and 74th St., to Wm. Kennedy Constr. Co., 215 Montague St. Est. $140,000. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

N. Y., Elmhurst—Jacmar Operating Corp., 186 Remsen St., Brooklyn, 6 story apartment, Whitney Ave. and Elbertson St., separate contracts now being awarded. $250,000. M. N. Weinstein, 93 Court St., Brooklyn, archt. Noted May 7, C. D.—May 14, E. N.-R.

N. Y., Elmira—Elmira Savings Bank, Water St., general contract bank, Water St., to W. H. Welliver, 812 West 1st St. Est. $150,000. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

N. Y., Hollis — Labsal Realty Co., 147-25 Jamaica Ave., Jamaica, group 2 story, brick dwellings, 221st St. and 90th Ave., separate contracts and day labor. $140,000. L. S. Danancher, 147-25 Jamaica Ave., Jamaica, archt. Noted May 13, C. D.—May 21, E. N.-R.

N. Y., Irvington-on-Hudson—Corporation, c/o Westchester County Savings Bank, Tarrytown (1st unit), constructing tract development and 32 dwellings, North Bway., to Villard Contg. Co., 77 Rose St., Hastings. Est. $140,000. Private plans.

N. Y., New York—Bermax Realty Corp., 1460 Macombs Rd., constructing 6 story apartment, Morris Ave. and 182nd St., separate contracts awarded. $140,000. I. L. Crausman, 332 East 149th St., archt. Noted May 7, C. D.—May 14, E. N.-R.

N. Y., New York—Gusget Realty Corp., 215 East 149th St., 6 story apartment, 273 Fort Washington Ave., separate contracts now being awarded. $140,000. H. I. Feldman, 15 West 149th St., archt. Noted May 13, C. D.—May 21, E. N.-R.

N. Y., New York—East River Savings Bank, 26 Cortland St., altering heating, plumbing in four 5 story stores and apartments, 1673 York Ave., separate contracts awarded. $45,000. S. Daub, 63 Park Row, archt.

N. Y., New York—Sailors Snug Harbor, 262 Greene St., altering heating, plumbing in 5 story apartment, 13-19 East 8th St., separate contracts now being awarded. Est. $70,000 with fixtures. Corbett & McMurray, 130 West 42nd St., archts. Noted May 7, C. D.—May 14, E. N.-R.

N. Y., New York—Simon Bernstein, 15 East 40th St., altering heating, plumbing in 6 story apartment, 235 West 24th St., separate contracts awarded. $37,000 with fixtures. C. B. Meyers, 31 Union Sq., archt. Noted May 13, C. D.—May 21, E. N.-R.

N. Y., Pawling—Pawling School for Boys, science building, to B. M. Higginson, 248 Bway., Newburgh. Bids June 5. Noted June 3, C. D. —June 11, E. N.-R.

N. Y., St. Albans—St. Albans Federal Homes, 160-16 Jamaica Ave., constructing group 1 story, frame dwellings, 221st St. and 116th Ave., day labor. $140,000. Owner is purchasing materials. A. E. Allen, Garden City, archt.

★ **N. Y., Syracuse** — Bd. Trustees Syracuse University, general contract medical college, to A. E. Stephens Co., 1200 Main St., Springfield, Mass., $523,000***plumbing, to Edward Joy Co., 133 Market St., Syracuse, $72,482***heating, to J. W. Danforth Co., 70 Elliott St., Buffalo***electrical work, to L. W. Kiesewetter, 618 North Saline St., Syracuse, $48,200. Est. $825,000. P.W.A. Noted May 1, C. D.—Apr. 30, E. N.-R.

Tex., San Antonio—Joske Bros. Co., c/o M. Calvert, pres., Alamo Plaza, air conditioning system for large department store building, to Carrier Eng. Co. and General Supply Co., South Salado St., about $100,000; supplying, installing 30,000 sq.ft. mineral work for insulation, to General Supply Co., South Salado St. Noted May 18, C. D.—May 21, E. N.-R.

Wis., Milwaukee—Eaton Realty Co., 826 North Cass St., general contract constructing two 2 story, basement 24x112 ft. and one 2 story basement, 24x79 ft. apartment buildings, on Blue Mound Rd., to Peters Constr. Co., 2901 North 38th St. Noted May 8, C.D.

†*Federal Government*

INDUSTRIAL BUILDINGS

PROPOSED WORK

Colo., Boulder — MILL — Boulder Minerals Corp., Boulder, plans flotation-roast-cyanide ore reduction mills. $150,000. A. A. Zangora, pres., Boulder.

Ill., Chicago—PLANT—Chicago Screw Co., 1026 South Homan Ave., plans by J. B. Fischer, 7322 South Lafayette St., plant addition. $50,000 with equipment.

Ind., Anderson — FACTORY — Delco Remy Corp., 2401 Columbus Ave., F. C. Kroeger, genl. mgr., plans 1 story, 200x200 ft., concrete, steel factory addition, 18 ft. high. $50,000 or more with equipment. Owners engineering department in charge of buying material and erecting buildings with some day labor, steel will probably be set by outside help.

Md., Baltimore—FACTORY—Crosse & Blackwell Co., 6801 Eastern Ave., rejected bids June 1, 3 story, basement, 60x130 ft. factory, 6801 Eastern Ave. $90,000. Project will go ahead next spring. L. R. White, Jr., 10 West Chase St., archt. Noted May 7, C. D.—June 4, E. N.-R.

Mass., Springfield — PLANT — Westinghouse Electric & Mfg. Co., 647 Page Blvd., J. W. Huston, purch. agt., soon lets contract 2 story, 40x325 ft., brick, structural steel industrial building, concrete found., Page Blvd. To exceed $37,000. Private plans.

Minn., Minneapolis—BUS TERMINAL—Minnesota Motor Bus Terminal Co., 29 North 7th St., sketches by Johnson & Backstrom, 1200 Roanoke Bldg., stone, stucco bus terminal, incl. tanks, pumps, greasing equipment, etc., 10th and Hennepin Aves. $150,000.

N. J., Bayonne—PLANT—Ershler & Krukin, Inc., lessee, North Bergen (stainless steel products), plans plant improvements and purchase of equipment for Fifty-Second St. Co., owner, c/o lessee. To exceed $37,000.

N. J., Englewood—DRY DOCKS, etc.—Marine Dry Dock & Repair Corp., c/o H. J. Connors, 21 West St., New York, plans dry docks, shops, etc., vicinity of here. $250,000.

N. J., Harrison—PLANT—Peter Doelger Brewing Co., 501 West 125th St., New York, plans altering former P. Hauck Brewery. $100,000 with equipment.

N. J., Morristown — GARAGE, etc. — Aetna Realty Corp., 972 Broad St., Newark, plans by W. E. Lehman, 972 Broad St., Newark, 2 story garage, storage, service building, Ford Ave. To exceed $40,000. New Jersey Bell Telephone Co., 540 Broad St., Newark, lessee.

N. M., Santa Fe—WAREHOUSE—Chas. Ilfeld Co., Las Vegas, plans by G. F. Street, 127 East Water St., and soon takes bids 100x100 ft. warehouse.

N. Y., Albany—WAREHOUSE—National Casket Co., Inc., 60 Massachusetts Ave., Boston, Mass., plans by G. Young, 205 Davis St., Syracuse, constructing 3 story warehouse and office, Central Ave. To exceed $37,000.

N. Y., Brooklyn—PUMPING PLANT—American Mfg. Co., West and Noble Sts., plans by W. Higginson, 101 Park Ave., water pumping and sprinkler system for fire protection, etc., West and Noble Sts. $37,000 with equipment.

N. Y., New York—FACTORY—Metropolitan Life Insurance Co., 1 Madison Ave., plans by Lowinson & Todaro, 29 West 26th St., altering 27 story factory, 263 7th Ave. Est. about $37,000 with equipment.

N. Y., Wolcott—FACTORY—Olney & Carpenter, 191 Culver Rd., Rochester, plans rebuilding canning factory, Leavenworth St., destroyed by fire. $50,000. Private plans.

O., Cleveland—PLANT—Reilly Tar & Chemical Co., 1615 Merchants Bank Bldg., Indianapolis, Ind. (coal tar products), acquired 10 acre site alongside Republic Steel Corp's Corrigan, McKinney Works, and plans new plant in Cuyahoga Valley, Cleveland. $200,000.

O., Columbus — SUBSTATION — Columbus Railway Power & Light Co., M. Evans, vice-pres., plans substation, 4,000 volt circuits, at Arcadia Ave. and High St. $210,000.

O., Findlay—PLANT—National Refining Co., plans plant addition and installation atmospheric vacuum distillation unit at oil refinery. $200,000. **Maturity** soon. G. F. Arnold, supt.

O., Louisville — PLANT — Newsome Feed & Grain Co. plans altering former Hiner Steel Co. plant. $50,000.

O., Toledo—PLANT—Barrett Co. (tar products), 2762 Front St., plans plant improvements and group tanks. To exceed $37,000.

Pa., Williamsport — PLANT — Hilsher Paper Box Co., C. E. Wentz, treas., Day St., plans extension, alterations and improvements to 2 buildings at plant, Day St. $37,000 or more.

★ **Tenn., Columbia**—PHOSPHATE REFINING PLANT — Monsanto Chemical Co., 1700 South 2nd St., St. Louis, Mo., soon takes bids rein.-con. buildings for phosphate refining plant and equipment, incl. conveyors and other accessories for phosphate treatment plant, electric motors and controls, hoists, transformers, etc. $500,000 or more.

Wis., Milwaukee—PLANT—J. Schlitz Brewing Co., 235 West Galena St., making plans malting plant, North 3rd St. $400,000. E. Peterson, 312 East Wisconsin Ave., engr.

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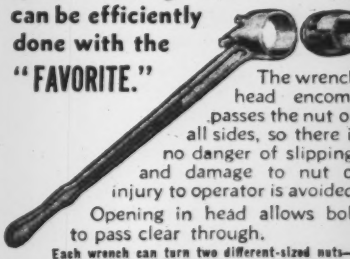
SPEED UP NUT TURNING WITH THE FAVORITE REVERSIBLE RATCHET WRENCH

Many operations require the quick turning of nuts. This can be efficiently done with the "FAVORITE."



The wrench head encompasses the nut on all sides, so there is no danger of slipping, and damage to nut or injury to operator is avoided. Opening in head allows bolt to pass clear through.

Each wrench can turn two different-sized nuts—one on each side of head. Reverse motion instantaneous by turning pawl.

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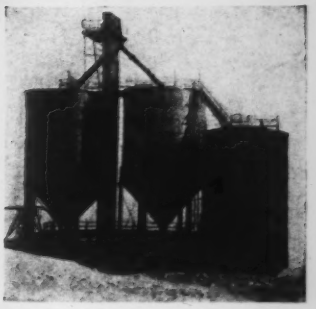

Aggregate for the concrete, Grand Coulee Dam, Washington, is stored in these Pittsburgh-Des Moines steel bins.

Bins — silos — hoppers; for sand, gravel, coal, coke, limestone, lime, soda ash, or any other material.

Pittsburgh DES MOINES STEEL COMPANY
3414 Neville Island, Pittsburgh
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Industrial Buildings (Continued)

Wis., Portage—FACTORY—Livermore & Samuelson, archts., 2 South Carroll St., Madison, soon lets contract constructing 2 story, 60x118 ft., brick, steel factory, plain found., for Portage Hosiery Co., Portage. Noted May 11, C. D.—May 14, E. N.-R.

BIDS ASKED

★ **Calif., Woodland**—REFINERY—Spreckels Sugar Co., 2 Pine St., San Jose, C. J. Maroney, mgr., taking segregated bids for 2 and 3 story, 20x85 ft., rein.-con. refinery unit, 2 story, 61x96 ft., rein.-con. office unit, concrete wood-lined bins equipped with air circulating system, warehouses, power plant, etc., $1,500,000. G. Kelham, 315 Montgomery St., archts. Engineering Dept. of Owner, engr. Noted Mar. 23, C. D.—Mar. 26, E. N.-R., under "Contracts Awarded."

Ind., Anderson — PLANT — See "Contracts Awarded."

Mich., Detroit—FACTORY—Giffels & Vallet, engrs. and archts., 604 Marquette Bldg., taking bids 1 story, basement, brick, steel, concrete factory building, 25,000 sq.ft. floor space, plain found., McNichols Rd., for Roman Cleanser Co., 9101 Delmar Ave. $50,000.

N. J., Newark—WAREHOUSE, etc.—L. & S. Realty Co. taking bids constructing 3 story, basement, rein.-con., steel warehouse and office, Mulberry St., Ballinger Co., 12th and Chestnut Sts., Phila., Pa., archts.

N. Y., Brooklyn—WAREHOUSE, etc.—Jerome Sherman, 245 Putnam Ave., taking bids on general and separate contracts constructing warehouses, tanks and pumphouse, etc. $312,000. Private plans.

N. Y., New York—GARAGE—See "Contracts Awarded."

N. Y., Niagara Falls—PLANT—Carborundum Co., Buffalo Ave., taking bids constructing 3 story, basement, 62x76 ft., fireproof plant addition. To exceed $37,000. Private plans.

N. Y., Tonawanda—WAREHOUSE—June 23, by Eastern States Milling Corp., Tonawanda, (bids from selected list bidders), constructing warehouse, Ontario St. To exceed $37,000. A. E. Baxter Eng. Co., 344 Delaware Ave., Buffalo, engrs.

N. Y., Utica—WAREHOUSE, etc.—See "Contracts Awarded."

O., Cleveland — LAUNDRY and BOILER HOUSE—West End Laundry Co., A. J. Salzer, pres., 10610 Madison Ave., taking bids one 150 hp. boiler and ash and coal handling equipment for laundry addition and boiler house, on 10610 Madison Ave. $30,000. H. M. Morse, 823 Prospect Ave., archt. Noted June 4, C. D. —June 11, E. N.-R.

CONTRACTS AWARDED

Calif., Los Angeles—FACTORY—Harbor Box & Lumber Co., 1428 South Alameda St., 1 story, 150x478 ft., corrugated iron walled factory, 3030 East Pico Blvd., $50,000. Owner builds under supervision of W. J. Moran, 1011 South Vermont Ave., Alhambra. Noted Sept. 20, C. D.—Sept. 26, E. N.-R.

Calif., San Diego—FACTORY—Consolidated Aircraft Corp., 3302 Atlantic St., new units, incl. 100x450 ft. L-shaped addition to northeast end of plant, 100x200 ft. wing and 100x100 ft. mezzanine floor, 50x200 ft. addition to west side and 3 small detached buildings, one 50x200 ft. and other 2, each 40x50 ft., to B. O. Larsen, 1346 E St., $93,306; furnishing, erecting steel frame, to Consolidated Steel Corp., 6500 East Slauson Ave., Los Angeles. Bids Apr. 7. Noted Apr. 3, C. D.—Apr. 9, E. N.-R.

Calif., San Jose—WAREHOUSE, etc.—Barron Gray Packing Co., 5th and Martha Sts., 1 story, rein.-con. warehouse and packing plant, Martha St., to Megna & Newell, 838 Minnesota Ave., $42,500. W. D. Lotz, 1040 Benton St., engr.

Calif., San Leandro—FACTORY—F. K. DuPuy, general contractor, 110 Sutter St., San Francisco, plumbing for rein.-con. factory, to Scott Co., 243 Minna St., San Francisco, for Friden Calculating Machine Co., 1 Montgomery St., San Francisco***concrete, to J. H. Fitzmaurice, 2857 Hannah St., Oakland***painting, to American Building Maintenance Co., 2016 7th Ave., Oakland***roofing, to General Roofing Co., 3985 Beach St., Oakland. Noted May 22, C. D.—May 28, E. N.-R., under "Contracts Awarded."

Conn., Bridgeport—SERVICE STATION—International Harvester Co. of America, lessee, 320 North Ave., general contract 1 story, 80x150 ft., brick, steel sales and service automobile trucks service, Fairfield Ave., to Accardi Constr. Co., Inc., 71 Cornell St., for C. Rickard & Son, J. Rickard, vice-pres. (owner), Howard, General contractor receiving bids for sub-contracts and materials. Noted Apr. 3, C. D.—Apr. 9, E. N.-R.

Conn., Clinton—PLANT—Aberthaw Constr. Co., general contractors, 80 Federal St., Boston, Mass., reinforcing steel for 3 story, 80x215 ft., rein.-con. plant, to Bancroft Martin Rolling Mills Co., 7 Main St., South Portland, Me., for Ponds Extract Co., Clinton. Total est. $140,000. Noted May 28, C. D.—June 4, E. N.-R., under "Contracts Awarded."

Conn., East Hartford (Br. Hartford)—PLANT—Olds & Whipple, Inc., 166 State St., Hartford, 1 story, 130x145 ft. fertilizer plant addition, mill construction with steel frame, to Bartlett-Brainard Co., 16 Van Dyke Ave., Hartford. Electrical bids being received. Noted June 4, C. D.—June 11, E. N.-R.

Conn., Hartford—FACTORY—Allyn Wadhams Co., general contractors, 15 Lewis St., painting for 1 story, 45x142 ft. and 15x40 ft., brick, timber factory addition, to J. Johnson Sons, Main St., New Britain, for Silex Co., 88 Pliney St. Noted May 29, C. D.—June 4, E. N.-R., under "Contracts Awarded."

Conn., Hartford — LABORATORY — Bartlett-Brainard Co., general contractors, 16 Van Dyke Ave., metal partitions for alterations and extensions to laboratory, storage and office unit, to R. V. Thomas, 18 Sequin St., New Britain, for Hartford Gas Co., 233 Pearl St., Hartford ***painting, to Ligh & Addis, Colton St., Windsor. Noted June 1, C. D.—June 4, E. N.-R., under "Contracts Awarded."

Conn., Stamford — FACTORY — Orthopedic Shoes, Inc., Portsmouth, O., general contract 2 story, 25x200 ft., brick, steel factory addition, Fairfield Ave., to Genovese & Rich, Inc., 270 Atlantic St., Stamford***iron, to E. & M. Iron Wks., 26 Woodrow St., Stamford. Plumbing, heating, ventilating and electrical work will be awarded by owners. Total est. $37,000. Private plans.

Conn., Waterbury—PLANT—T. G. Smith Co., general contractors, 18 Orange St., iron for brewery plant addition, to Waterbury Iron Wks., Inc., Porter St., for Largay Brewing Co., Inc., 1090 Bank St.***stone, to Thomas F. Jackson Co., 111 West Main St.***electrical work, to Wiehn Electric Co., 57 Easton Ave.***plumbing, to M. J. Daly & Sons, Inc., 555 Bank St. Heating by owner. Noted June 8, C. D.—June 11, E. N.-R., under "Contracts Awarded."

Ill., Monsanto—POWER PLANT—Monsanto Chemical Co., 1700 South 2nd St., St. Louis, Mo., -contract for design and construction of 59x130 ft. power plant addition, to Stone & Webster Eng. Co., 90 Broad St., New York, est. $550,000.

Ind., Anderson—PLANT—Guide Lamp Corp., 26th and Arrow Sts., F. Burke, mgr., constructing 36x36 ft., steel, concrete storage building; 280x450 ft. main factory building with monitor type room construction, day labor; steel, to Indiana Bridge Co., Muncie. Est. $100,000. Noted Jan. 31, C. D.—Feb. 6, E. N.-R.

Ia., Davenport — TURBINE GENERATOR UNIT—Tri-City Gas & Electric Co., Davenport, furnishing, installing 28,000 kva. turbo-generating unit for Riverside generating plant, to General Electric Co., River Rd., Schenectady, N. Y.

Me., Portland—FACTORY, etc.—Armour & Co., 316 LaSalle St., Chicago, Ill., G. A. Nickholds, supt., 120 Broadway, New York, 1 story, 55x104 ft., 24x65 ft., brick, steel factory and storage, concrete founds., Commercial St., to Brown Constr. Co., 526 Congress St., $70,000. F. A. Lindberg, 316 LaSalle St., Chicago, Ill., engr.

Mass., Gardner—BOILER PLANT—Heywood-Wakefield Co., Lake St., general contract 1 story, 53x67x37 ft. boiler plant, to E. J. Cross Co., 82 Foster St., Worcester***boilers, to Babcock Corp., 474 Dorchester Ave., South Boston ***pulverizers, to Riley Stoker Corp., 27 State St., Boston. Total est. about $100,000. Noted June 2, C. D.—June 4, E. N.-R.

Mass., Springfield—FACTORY—Moore Drop Forging Co., 13 Walter St., 1 story, 60x250 ft., steel, sheet steel factory unit, Walter St., to A. J. Daniels, 661 Main St., Shrewsbury. Noted Apr. 6, C. D.—Apr. 9, E. N.-R.

Minn., St. Paul—PLANT—Brandtjen & Kluge, Inc., constructing 2 story, basement, 53x168 ft., steel, brick addition to plant, Blair and Gautier Sts., to C. J. Andreen & Son, 388 Iglehart Ave. A. C. Fleischbein, 442 Endicott Bldg., archt.

Mo., St. Louis—ELECTRICAL APPLIANCE PLANT—H. B. Deal & Co., Inc., general contractors, 1218 Olive St., excavation for 2 story, basement, 65x127 ft., rein.-con., brick plant addition for J. R. Kearney Corp., 4236 Clayton Ave., to Krummel & Janssen, 5978 Southwest Ave.

Mo., St. Louis—MARKET—Schenberg's Markets, Inc., M. Schenberg, pres., 3853 South Bway., superstructure for 1 story, part basement, 83x120 ft., California type open market, Grand Blvd. near Winnebago St., to Baerveldt & Honig Constr. Co., 624 Wainwright Bldg. Est. $50,000. Noted May 27, C. D.—Apr. 2, E. N.-R.

Mont., Great Falls — STOCKYARDS — Great Falls Livestock Comm. Co., constructing (1st unit), pens, water system, runways, feedracks and loading chutes, to Ferche & Karaffa, Great Falls. $13,100.

Mont., Heath—WAREHOUSE—U. S. Gypsum Co., 300 West Adams St., Chicago, Ill., general contract 1 story, 50x422 ft., steel, hollow tile curtain wall warehouse, to James Leck Co., 211 South 11th St., Minneapolis, Minn., and Lovering Longbotham Co., 605 Builders Exch., St. Paul, Minn. Est. $75,000.

N. H., Rochester—POWER HOUSE, etc.—Gonic Mfg. Co., Gonic (Rochester), 2 story, basement, irregular sized brick, steel power house and dye house, concrete found., to A. L. Phelps, Inc., 496 Bridge St., Springfield, Mass. Est. $35,000 to $40,000. H. G. White, 496 Bridge St., Springfield, Mass., archt.

N. J., Garfield—FACTORY—Chambon Corp., Union City, constructing complete alterations to existing factory, Outwater Lane, to E. Stearns, 56 James St., Montclair, $40,000 plus. Freesman, Dynes & Osborne, 13 Orient Way, Rutherford, archts.

N. Y., Brooklyn—PLANT—J. B. Williams Co., 423 38th St., constructing plant, 423-38th St., to Morrison Allardyce Constr. Co., 419 5th Ave. Est. $37,000. Noted May 11, C. D. —May 14, E. N.-R.

N. Y., Buffalo—BREWERY—Iroquois Beverage Corp., 230 Pratt St., structural steel for brewery addition, 230 Pratt St., to Ernst Iron Wks., 75 Lathrop St. Total est. $80,000. Noted June 8, C. D.—June 11, E. N.-R.

N. Y., Buffalo—GRAIN ELEVATOR—Hydro Constr. Co., general contractors, Stock Exch. Bldg., reinforcing steel for grain elevator, warehouse and office for Cooperative G. L. F. Mills, Inc., Chamber of Commerce Bldg., to Ransom, Inc., 154 West Huron St.***metal lathing and plastering, to J. H. Davis Co., 80 Leslie St. ***steel sash, to J. P. Hunt, 132 University Ave. Noted May 26, C. D.—June 4, E. N.-R., under "Contracts Awarded."

N. Y., Dunkirk—FACTORY—Gillmore Carmichael & Olson Co., general contractors, 4100 Euclid Bldg., Cleveland, O., structural steel for factory, Howard Ave., for Ludlum Steel Co., Dunkirk, to Bethlehem Steel Co., Bethlehem Terminal Bldg., Cleveland, O., and Bethlehem, Pa. Noted May 13, C. D.—May 21, E. N.-R., under "Contracts Awarded."

N. Y., Geneva — BOTTLING PLANT — W. Frantz, general contractor, 20 Evans St., structural steel for factory, for Geneva Coco Cola Bottling Corp., 82 State St., to Auburn Iron Wks., 143 Kelsey St., Auburn***stone, to Goodstone Mfg. Co., 470 Hollenbeck St., Rochester ***roofing, to Carey Co., 103 Oak St. Noted Apr. 27, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

N. Y., Glens Falls—BOILER PLANT—Imperial Power & Color Corp., Warren St., general contract boiler plant, Warren St., to Howard Ramsey, 42 Notre Dame St. Est. exceeds $37,000 with equipment.

N. Y., Long Island City—PLANT—Nichols Copper Co., 43-09 55th Dr., altering plant and constructing steel crane runway, separate contracts now being awarded. $75,000. Private plans.

N. Y., New York—GARAGE—New York Edison Co., 4 Irving Pl., altering garage and office, 718 1st Ave., separate contracts, $37,000 with equipment. Private plans. Noted May 11, C. D.—May 14, E. N.-R.

N. Y., Niagara Falls—COAL SILOS—G. N. Maloney, 1037 South Ave., Niagara Falls, constructing 9 rein.-con. coal silos, 20x60 ft., incl. loading equipment, to Nicholson Co., 405 Lexington Ave., New York. Est. $40,000. Noted Feb. 27, C. D.—Mar. 5, E. N.-R.

★ **N. Y., Rochester**—STEAM TURBINE GENERATING PLANT—Rochester Gas & Electric Corp., 89 East Ave., steam turbine generating plant, to A. W. Hopeman & Sons Co., 569 Lyel Ave. Est. $1,000,000. Noted May 15, C. D.—May 21, E. N.-R.

N. Y., Sidney—FACTORY—Scintilla Magneto Co., Sidney, general contract factory, Sherman Ave., to Frank Lewis & Sons, Bainbridge. Est. $40,000. General contractor awarded structural steel, to L. P. Butts, Inc., Oneonta. Noted Apr. 29, C. D.—May 7, E. N.-R.

N. Y., Syracuse—FACTORY—F. E. Young, general contractor, 415 Euclid Ave., masonry work for 2 story, 61x100 ft. factory, Gifford St., for Syracuse Electrotyping Corp., 122 Dickinson St., to M. Sinesi, 209 Orlando Ave.*** roofing, to T. Talbot & Son, 1012 Burnet Ave. ***stone, to Onondaga Litholite Co., 102 North Beech St. Noted June 2, C. D.—June 4, E. N.-R., under "Contracts Awarded."

N. Y., Utica—WAREHOUSE, etc.—Richfield Oil Co., 19 West 60th St., constructing warehouse, office and garage, separate contracts; storage tanks, to Chicago Bridge & Iron Wks., 165 Bway., New York. Est. exceeds $40,000. Noted June 3, C. D.—June 11, E. N.-R.

Tex., Houston—PLANT—Linde Air Products Co. of Texas, 6119 Harrisburg Blvd., 40x60 ft., steel, brick, concrete plant addition, to Tellepsen Constr. Co., 3900 Clay St., Houston, or c/o owners. Est. $37,000 with equipment.

Wis., Racine—FACTORY—Twin Disc Clutch Co., 2 story, 60x120 ft., brick, steel factory, plain found., to Nelson & Co., Racine. F. J. Hoffman, Racine, archt.

Ont., Essex — FACTORY — Gosselin Constr. Co., general contractors, 14 Felix Ave., Sandwich, millwork for 1 story, 80x105 ft. and 50x120 ft. buildings for food factory, for Empire Foods Corp. Ltd., 159 Bay St., Toronto, to Walkerville Lumber Co., Walker Rd., Walkerville; plumbing and heating, to L'Heureux Plumbing & Heating Co., 43 Wyandotte St., Windsor. Noted May 29, C. D.—June 4, E. N.-R.

Ont., Toronto—SOAP FACTORY—Lever Bros. Ltd., 299 Eastern Ave., general contract 3 story, 160x160 ft., brick, steel soap factory to Wells & Gray Ltd., Confederation Life Bldg., est. $200,000; also alterations to present building and rein.-con., brick additions of 3 small units, to Holtby Constr. Co. Ltd., 279 Rusholme Rd., $110,000. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

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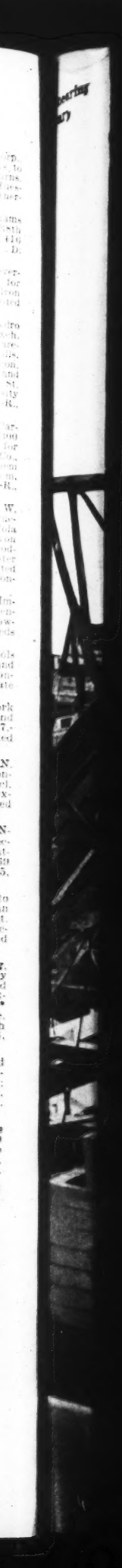
For official proposal advertising see Searchlight Section

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